RAILWAY

LOCOMOTIVES AND CARS

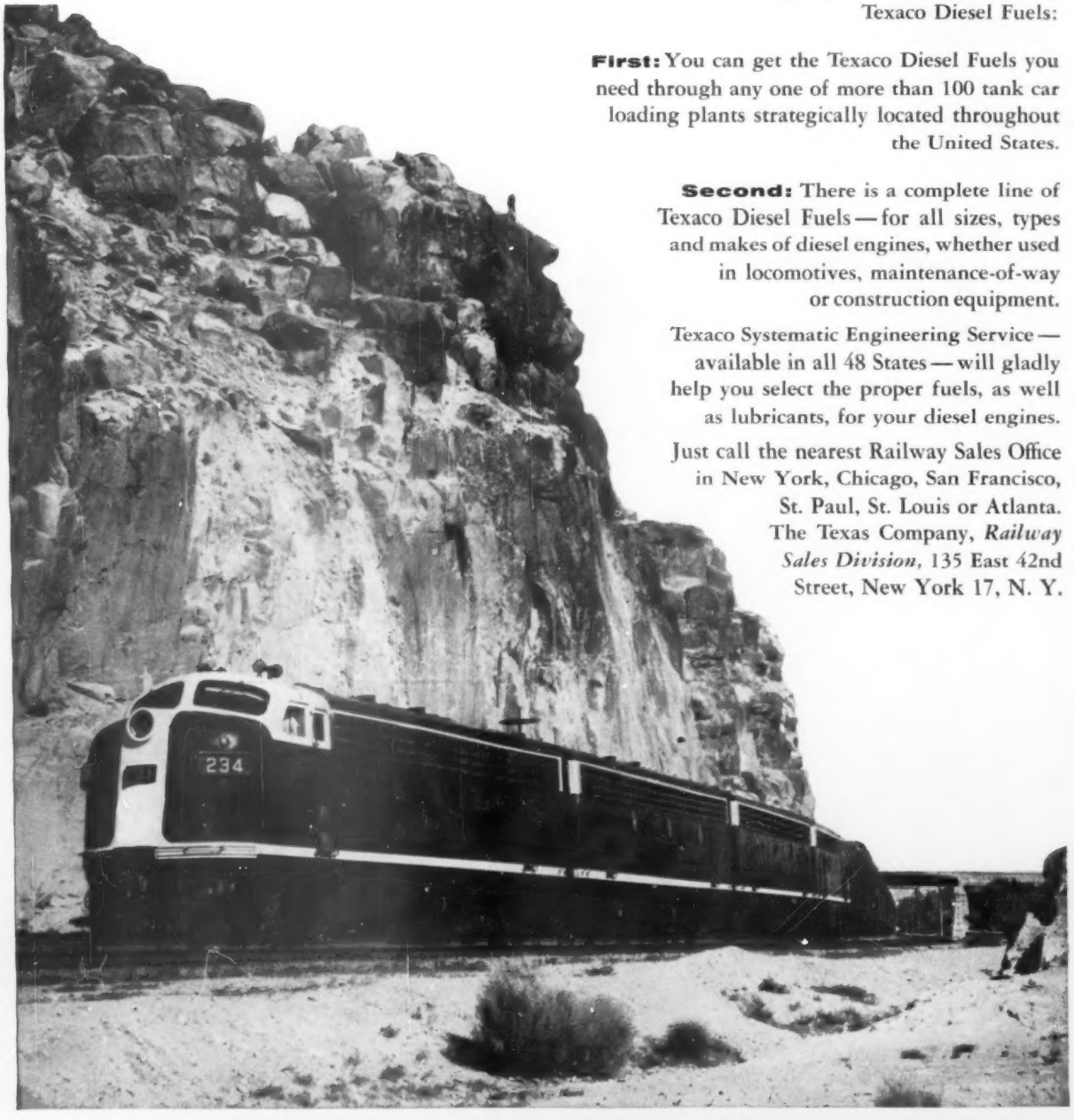
A SIMMONS-BOARDMAN **TIME-SAVER** PUBLICATION JANUARY 1958

Biggest gas turbine ready for the rails

FOUNDED
1832
AMERICA'S
OLDEST
TRADE PAPER

Nation-Wide Availability

TEXACO DIESEL FUELS



Check these two important advantages in using Texaco Diesel Fuels:

First: You can get the Texaco Diesel Fuels you need through any one of more than 100 tank car loading plants strategically located throughout the United States.

Second: There is a complete line of Texaco Diesel Fuels — for all sizes, types and makes of diesel engines, whether used in locomotives, maintenance-of-way or construction equipment.

Texaco Systematic Engineering Service — available in all 48 States — will gladly help you select the proper fuels, as well as lubricants, for your diesel engines.

Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Railroad Lubricants

AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

Years . . .

MINER

RAILWAY APPLIANCES

have contributed effectively to railway progress. Our products are known for their reliability by railway men throughout the world, and we shall continue to concentrate our efforts on appliances that excel in quality and service.

W. H. MINER, INC. CHICAGO

MANUFACTURERS OF RAILWAY APPLIANCES SINCE 1891

P-S Freight Cars and Parts

This booklet will give you the facts ...write for it!

Put Pullman-Standard at the top of your source list for cars, car parts and specialties. Whether built to P-S specifications or your own, you benefit by over 100 years of carbuilding experience. You benefit, too, because Pullman-Standard cars and car parts are the product of economical, high quality mass production building methods.

Before you specify or buy, write for a copy of Freight Cars and Parts Booklet A-457 . . . study the facts . . . see what fabrication and delivery by a single, experienced source—Pullman-Standard—can mean.

THE WORLD'S LARGEST CARBUILDER

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY
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Phone: Alpine 1-4283

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Room 743, Oliver Building
Phone: Atlantic 1-1833

NEW YORK 17, NEW YORK
711 Third Avenue
Phone: Oxford 7-5780

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RAILWAY
LOCOMOTIVES AND CARS

The Oldest Trade Paper
In the United States

Editorial and Executive Offices:
30 Church Street, New York 7

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TIME-SAVING IDEAS FOR **JANUARY 1958**

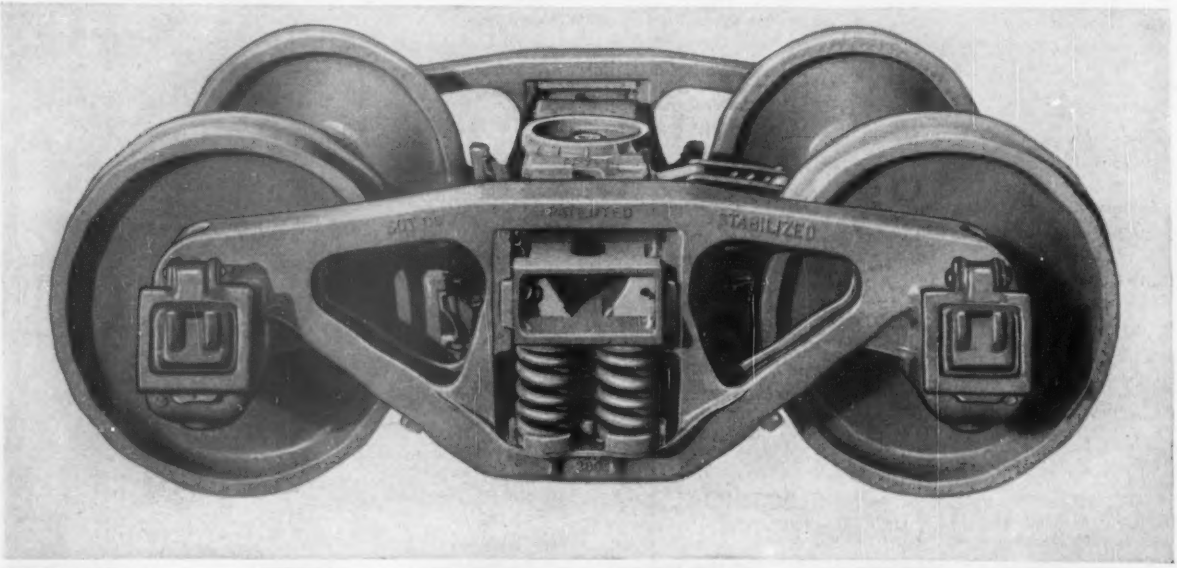
Volume 132 • No. 1

MOTIVE POWER AND CAR

ELECTRICAL

DEPARTMENTS

World's Easiest Truck Servicing BEGINS WITH



BARBER STABILIZED TRUCKS

Less service time and costs add up to important savings. So, experienced freight car designers naturally "Begin With Barber Stabilized Trucks." Because: When necessary to service Barber parts, friction castings, wear plate and side springs are removed and replaced *5 to 10 times faster* than those of other trucks . . . can be inspected at a quick glance. Result of the *more than 475,000 Barber car sets sold,* none has ever worn out!

Standard Car Truck Company, 332 South Michigan Avenue, Chicago 4, Illinois. *In Canada:* Consolidated Equipment Company, Ltd., Montreal 2, Quebec.

Announcing the new

SIOUX air impact wrench

A name that means something

IN POWER! The new SIOUX Air Impact Wrench packs a real punch! . . . with 90 pounds of pressure in 10 seconds Model 315 delivers 130 torque foot pounds; Model 317 delivers 185 torque foot pounds!

IN EFFICIENCY! The new SIOUX Air Impact Wrench is capable of delivering 15% more torque from the same air pressure while consuming 30% less air. Its efficiency is truly remarkable.

IN STAMINA! SIOUX Tools Last Longer! Powdered iron bearing surfaces on motor end plates assure extra durability and a close air seal. Substantial ball bearings contribute to a smooth, long life. Much of the friction of metal rubbing upon metal has been eliminated in this exclusive SIOUX mechanical design. Fewer moving parts assure longer life.

IN TORQUE CONTROL! The SIOUX power regulator permits running a series of nuts to the same degree of tightness. Power setting number five gives full power to blast loose and remove tight, rusted, and frozen nuts. Only a 180° turn is required to reduce power from setting five to setting one.

IN VALUE! The extra power, extra economy of the low air consumption, the extra assurance of long, trouble-free life which the SIOUX name insures . . . these are the bonus values in the competitively priced, new SIOUX Air Impact Wrench.

ANGLE ATTACHMENT FOR HARD TO REACH PLACES

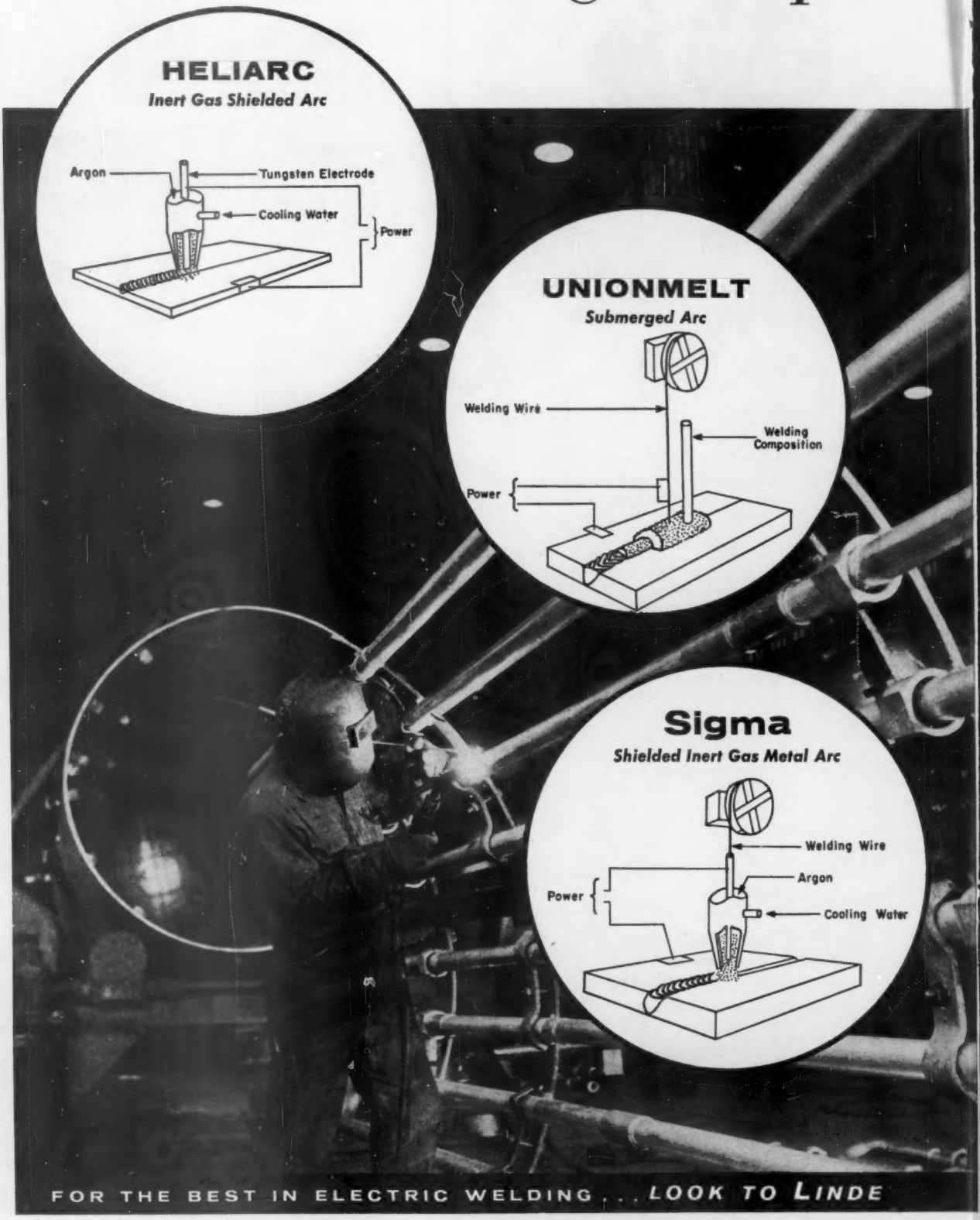
SPECIFICATIONS

Wrench Number	315	317
Cap. Bolt Size	⅜"	11/16"
Torque foot pounds at 120 pounds air pressure in 10 seconds	195	235
Length	7⅛	7⅛
Side to Center	1⅞	1⅞
Socket Drive	½ Sq.	⅝ Sq.
Average air consumption	3½ Cu. Ft.	3½ Cu. Ft.
Net Weight (tool only)	5½ lbs.	5½ lbs.

ALBERTSON & CO., INC.
SIOUX CITY, IOWA • U.S.A.

ELECTRIC DRILLS • SANDERS • IMPACT WRENCHES • POLISHERS • PORTABLE SAWS • SCREW DRIVERS • FLEXIBLE SHAFTS • ABRASIVE DISCS • AIR IMPACT WRENCHES

From Car Building to Repair



. . . LINDE provides the *right welding method!*

Inert gas shielded arc welding—

HELIARC Welding is helping railroads save up to 88% of new rolling stock cost by simplifying and speeding many car fabrication jobs. This process, using a tungsten electrode and a shield of LINDE argon, is tops for joining hard-to-weld commercial metals. HELIARC Welding produces high-quality welds that resist corrosion and eliminate costly grinding and finishing.

Submerged arc welding—

Big savings in time and materials in the fabrication and reconstruction of all types of rolling stock are made possible with UNIONMELT Welding. Materials ranging from light gage to heavy plate, adaptable to mechanization, can be most economically joined by UNIONMELT Welding. UNIONMELT Welding is also used extensively for resurfacing metal, providing extra wear and corrosion resistance.

Shielded inert gas metal arc welding—

One of the most versatile welding methods for railroad car fabrication is Sigma Welding. LINDE's Sigma apparatus, using a shield of LINDE argon, is ideal for manual welding of commercial metals ⅛ in. or more thick, and for automatic operation on lighter gage metals to .050 in. Highest quality welds can be made on aluminum thicker than ⅛ in. at speeds up to 16 inches per minute. Build-up and surfacing jobs are also improved by using LINDE's Sigma welding method.

New! Magnetic flux gas shielded arc welding—

UNIONARC Welding, LINDE's latest contribution to the railroad industry, is an extremely fast method for welding mild steel. This method employs a continuously-fed, bare steel wire electrode, magnetically coated with flux conveyed in a stream of carbon dioxide shielding gas. Manual welds can be made easily in any position—vertical, overhead, downhand—with no stops to change electrodes. The speed, versatility, and ease of operation of UNIONARC Welding brings costs down 25% to 65% below those of manual covered electrode welding. Clean, smooth, high-quality welds are provided, even in the presence of moderate amounts of rust, scale, and moisture.

LINDE engineers have worked with railroad men for many years designing, developing and testing electric welding methods and apparatus . . . to improve road maintenance, equipment repair and shop fabrication. This wealth of experience is yours for the asking. Just call your nearest LINDE office.

LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

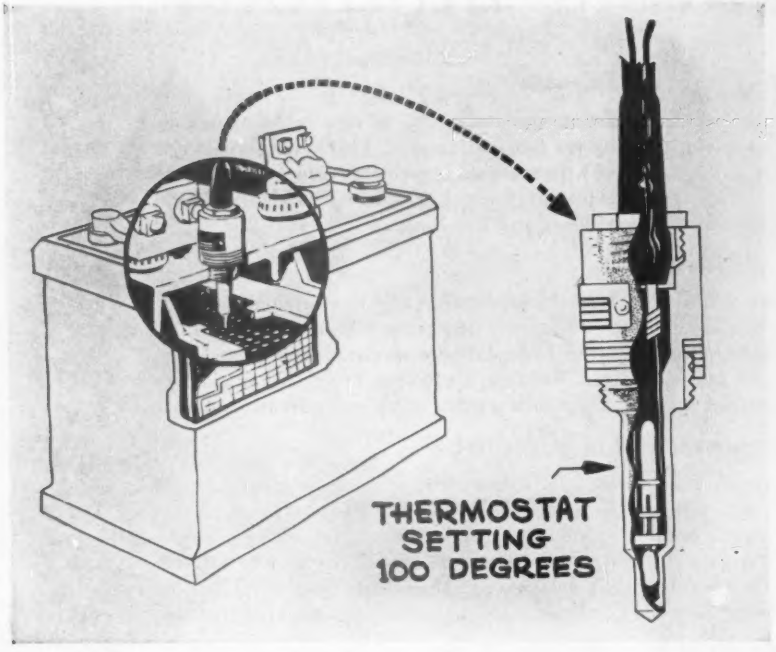
RAILROAD DEPARTMENT

Linde TRADE-MARK

UNION CARBIDE

The terms "LINDE," "HELIARC," "UNIONMELT," "UNIONARC," and "UNION CARBIDE" are trade marks of Union Carbide Corporation.

LOCOMOTIVES AND CARS WHAT'S NEW IN EQUIPMENT



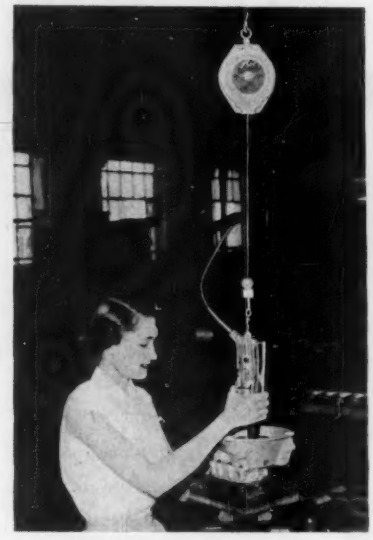
Battery Thermostat

This battery temperature control is said to prolong the life of lead acid storage battery sets by keeping the electrolytic solution from over-heating due to high charging rates.

It consists of two parts, a Vapor mercury contact thermostat set at 100 deg F and a dust-proof bottle relay housing the relay contacts, the only moving parts in the control. The non-corroding thermostat tube is enclosed in a transparent lucite housing which is threaded through an opening in the top of a centrally located battery in set. The sensing end dips into battery solution about two inches. When battery solution temperature reaches 100 deg, thermostat contacts close the relay circuit, this in turn closes a bridge around a portion of the voltage regulator resistance unit. The battery continues to be charged at maximum allowable rate possible while battery solution is at 100 deg, the control point.

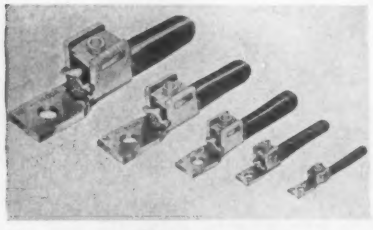
Relays are available for 32-, 64- and 110-volt battery systems. Thermostats are 3⅝-in. long and weigh 6½ ounces.

The housing is threaded and fitted for a two conductor lead. *Vapor Heating Corporation, Dept. RLC, 80 East Jackson blvd., Chicago 4.*



Suspension Balancers

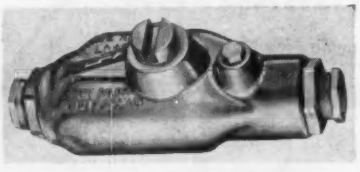
Two new streamlined suspension balancers, featuring Thor's automatic "no drop" safety brake for the safe handling of air and electric tools, inspection gauges, welding and other equipment, have been introduced. Model 5LB6 will suspend loads up to 5 lb; Model 10LB6 is designed for equipment weighing 1 to 10 lb. Both have full swivel upper hook, with auxiliary suspension for safety. Spring-reel cable devices hold equipment at operating levels. *Thor Power Tool Company, Dept. RA, Prudential Plaza, Chicago 1, Ill.*



Pressure Type Cable Lugs

Socket type set screws feature the 55 to 515 amp "wide-range" pressure lugs for electrical installations illustrated. The cadmium plated lugs are designed for use in entrance switches, service troughs, panel boards, shallow housings and confined areas where bolt head projections present an installation problem.

Tightening socket, guide pad and contact pad are made of case hardened steel to assure lock-tight maximum pressure against the conductor wedged in the bottom of the assembly. Positive conductivity is provided by the copper formation of the wire trough and large contact area of the lug unit. *National Electric Products Corporation, Dept. RLC, Pittsburgh.*

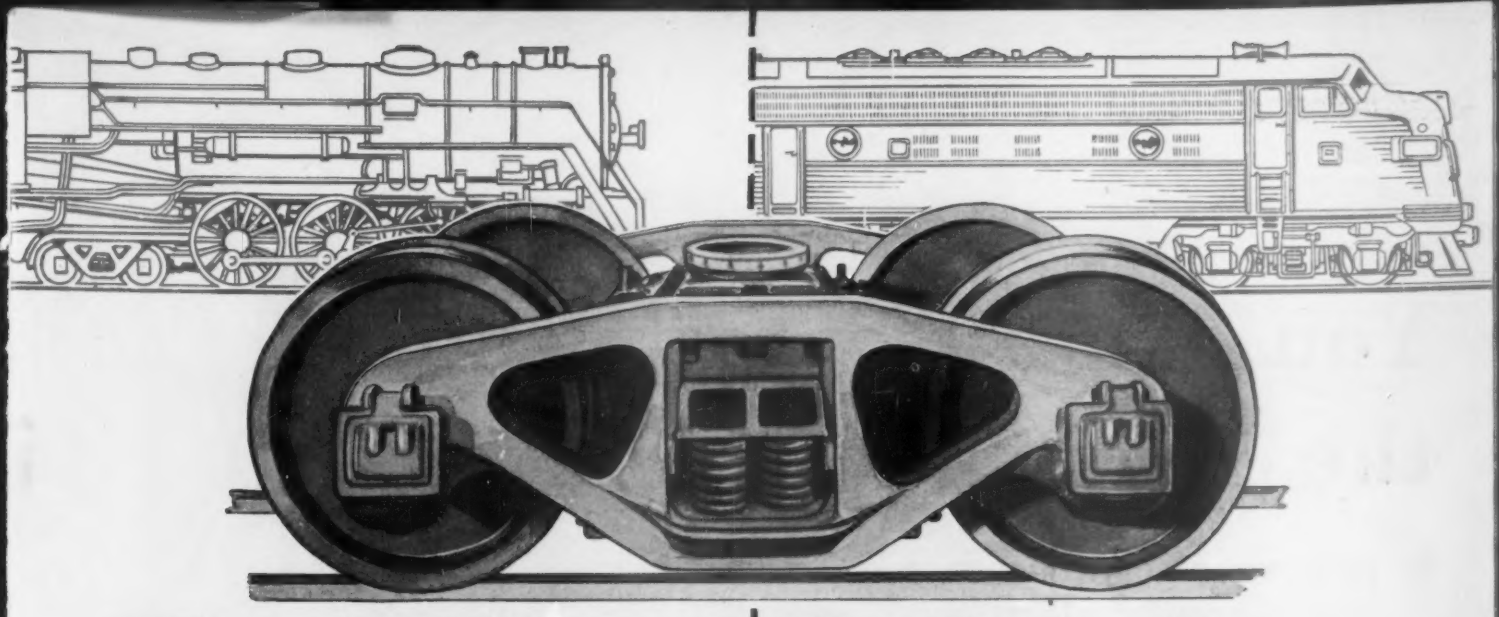


Automatic Line Oiler

The LO380 automatic line oiler shuts off the air supply in air tools when the oil is used up. It is light in weight, easily adjusted, and refillable while in use. The positive type oil pickup feeds oil the instant drilling starts. Its one-pint capacity is more than adequate for one shift of operation. The oiler prevents waste of excessive oiling due to inadequate adjustments of conventional line oilers, and oil flow can be adjusted without shutting off air pressure.

The oiler body is aluminum, weighs 9 lb, and is of streamlined design. Its

(Continued on page 68)



The Old and the New...

...from waste to JBS

A Great Step Forward!

With waste gradually being discontinued in journal lubrication, the change-over to a better type of lubricator raises certain questions: what type should it be; what qualities should it possess; what kind of a performance should be expected of it? To help you decide, consider what the JBS Acme Lubricator offers and compare it with any other lubricator. JBS Acme alone has the exclusive all-wool quilted core* which retains many times its own weight in oil reserve. Heavy chenille loop pile surfaces assure an ample supply of filtered oil at all times. JBS Acme Lubricators are unaffected by temperature changes and wick AAR specification car oil even at 45° below zero in road service tests. JBS Acme Lubricators require no modification of the standard journal box, are designed to hold their position in the box, and assure better performance with less servicing.

Write Today for Detailed Information and Folder

JBS ACME JOURNAL LUBRICATORS

- ★ Retains oil up to 4 times its own weight
- ★ Requires no modification of journal box
- ★ Wicks AAR specification car oil even in coldest weather
- ★ Assures better performance with less servicing
- ★ Has exclusive all-wool quilted core*
- ★ Reinforced for extra wear
- ★ Cannot glaze
- ★ Readily reclaimed

GUARANTEED Quality, Workmanship and Material as represented

*Patent applied for

JOURNAL BOX SERVICING CORP.

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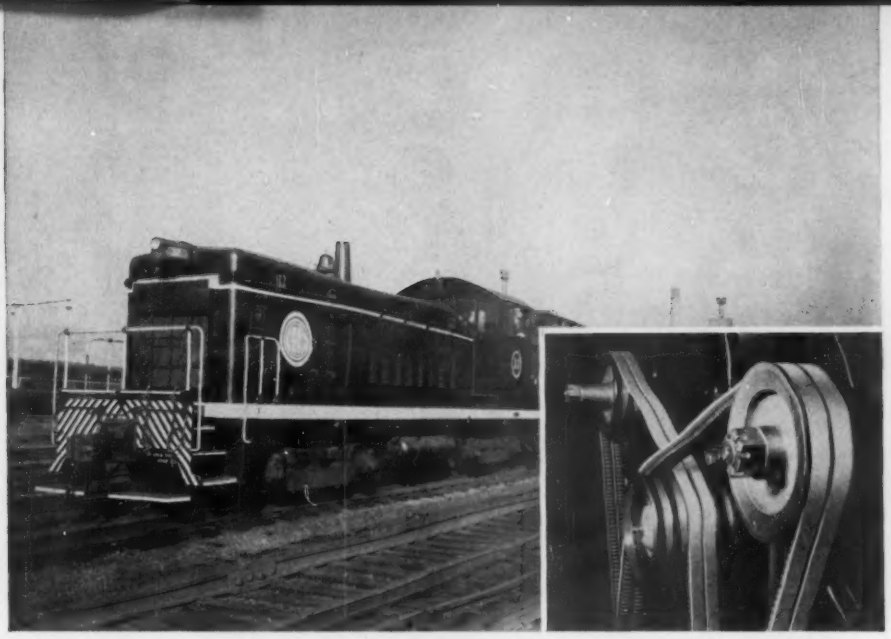
You can always depend on the Dayton Field Engineer

to provide efficient, economical V-Belt drives for positive, steady electrical power on your trains

He sees your V-Drive problem first hand. With the help of your electrical and mechanical engineers, he works out the best solution for that problem, specifies the proper Dayton equipment and sees that it is delivered and correctly installed. When your V-Drive is working at top efficiency, providing the positive power, dependable service, and economical operation always supplied by Dayton V-Belts—his work is only half finished. Then he begins a periodic check on your Dayton-equipped drives—at various stages of operation—under all weather and road conditions.

Experienced Dayton Field Engineers are always available, across the country, to serve you better through the application of the best in technical knowledge and V-Belt equipment. Write Dayton Rubber Co., Railway Division, Dayton 1, Ohio, for complete information.



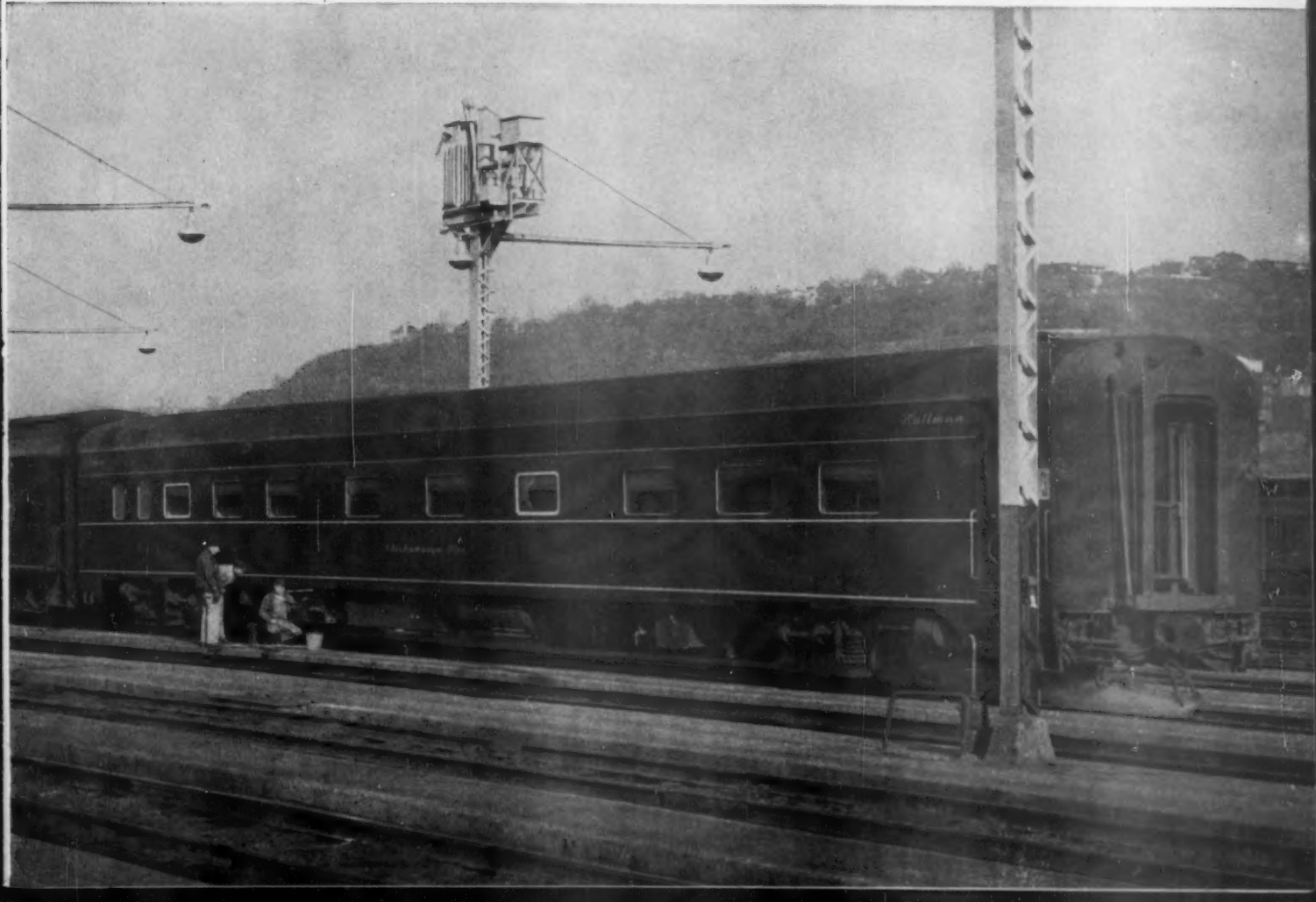
When your Dayton Field Engineer specifies Dayton V-Belts, he assures you the best possible V-drive operation. Dayton V-Belts are on more cars than all other makes of V-Belts and are specified as original equipment on 90% of all new Diesel locomotives.

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, Dallas, Dayton, Minneapolis, Moline, New York, San Francisco and St. Louis

*TM



LOOK AT

1.

Longer Service Life

All ASF Extended Life Springs are shot-peened—which cold-works surfaces and more than doubles the life of the spring.

ASF

ALL THREE

...before you specify truck springs!

2. Better Performance

A new heat-treating process makes ASF Extended Life Springs far better able to maintain load-carrying capacity—without permanent set.

3. Lower Cost

ASF Extended Life Springs are now available at no increase in cost over conventional springs. Because they last over twice as long, they cut your spring costs per car mile.

E-X-T-E-N-D-E-D L-I-F-E SPRINGS

A contribution to railroad progress...through research by

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

Other Foreign Sales: American Steel Foundries, International, S.A., Chicago

LEADER TO PROGRESS

RPI MEMBER

LOCOMOTIVES AND CARS REPORT FOR DECEMBER

Orders and Inquiries for New Equipment

Placed Since the Closing of the December Issue

Diesel-Electric Locomotive Orders

Road and builder	No. of units	Horse-power	Service	Other detail
CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC:				
Electro-Motive	10	1,750	Road switching	———
DULUTH, MISSABE & IRON RANGE:				
Electro-Motive	28	1,750	Road switching	Approx. unit cost, $245,000. For delivery before start of 1958 ore shipping season. Purchase of 36 additional units contemplated over next two years.
ILLINOIS CENTRAL:				
Electro-Motive	70	1,750	Road switching	GP-9's. Estimated cost, $12.5 million. Delivery by February 1.
NORTHERN PACIFIC:				
Electro-Motive	31	1,750	Road switching	———
	15	1,200	Switching	———
Alco Products	12	1,800	Road switching	———

Freight-Car Orders

Road and builder	No. of cars	Type of car	Cap., tons	Other detail
CANADIAN PACIFIC:				
Canadian Car	300	Gondola	—	———
	200	Stock	—	———
National Steel Car	475	Triple hopper	—	Cost to exceed $4,000,000.
BESSEMER & LAKE ERIE:				
Thrall Car	1	Flat	125	Cost, $40,000 each. April delivery.
	1	Flat	135	Cost, $40,000 each. April delivery.
CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC:				
Bethlehem Steel	55	Gondola	55	———
General American	50	Covered hopper	70	"Airslide."
CHICAGO, ROCK ISLAND & PACIFIC:				
American Car & Fdry.	10	Covered hopper	70	Unit cost, $10, 725. For February delivery.
DETROIT & MACKINAC:				
General American	25	Hopper	70	Delivery second quarter 1958.
ERIE:	6	Depressed center flat	140	58 ft 4 in. long.
Company shops	1	Depressed center flat	200	72 ft 6 in. long. Seven cars for second quarter 1958 delivery.
GEORGIA:				
American Car & Fdry.	75	Hopper	70	Estimated cost, $682,000. February delivery scheduled.
ILLINOIS CENTRAL:				
American Car & Fdry.	200	Covered hopper	70	Approx. cost, $2,000,000. 100 to be twin hopper; 100, triple hopper.
LOUISVILLE & NASHVILLE:				
Pullman-Standard	475	Box	—	Approx. cost, $4,400,000. Delivery to begin this month. Included are 225 40-ft cars with roller bearings, nailable steel floors and 8-ft doors, and 250 cars with friction bearings and wood floors.
MERCHANTS DESPATCH TRANSPORTATION CORP.:				
Pacific Car & Fdry.	50	Refrigerator	40	Est. unit cost, $12,295. April delivery expected.
MIDLAND PROPERTIES CO.:				
Pullman-Standard	5	Box	50	Unit cost, $8,350. Delivered in December.
NORTHERN REFRIGERATOR LINE:				
Pacific Car & Fdry.	100	Refrigerator	40	Est. unit cost, $12,295. April delivery expected.
WESTERN OF ALABAMA:				
American Car & Fdry.	25	Hopper	70	Estimated cost, $227,000. Delivery expected in February.

Passenger-Train Cars Orders

Road and builder	No. of cars	Type of car	Other detail
NORTHERN PACIFIC:			
Pullman-Standard	10	Baggage	Cost, $802,500. Second quarter delivery expected.

Inquiries and Notes

FREIGHT CARS:

Minneapolis & St. Louis—Will soon begin installation of Evans DF equipment at its Marshalltown, Iowa, shops.

Louisville & Nashville—Will install roller bearings on 230 passenger-train cars, including 120 baggage cars, 30 combination baggage-mail cars, and 30 coaches, at its South Louisville, Ky., shops at a unit cost of approximately $3,000.

RR Conference Will Be In Cleveland Next April

A railroad technical conference will be conducted jointly by the Land Transportation Committee of the American Institute of Electrical Engineers and by the Railroad Division of the American Society of Mechanical Engineers in Cleveland on April 9 and 10. Papers for the first day of this two-day meeting will be contributed by AIEE members; ASME papers will be presented the second day.

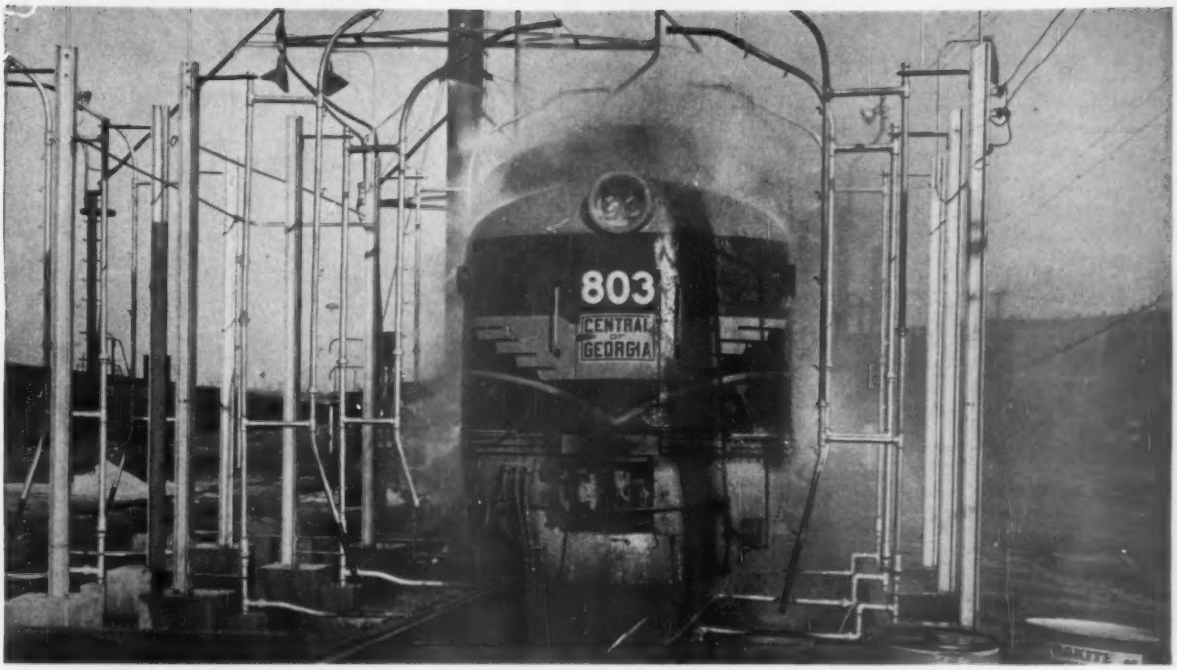
Details of this meeting were announced by division chairman F. K. Mitchell at the annual railroad luncheon held in conjunction with the meeting of the ASME Railroad Division in New York early last month. The speaker was ICC chairman Owen F. Clarke who called for railroads to speed up their scientific effort. "There is a corollary between the recent national experience," declared commissioner Clarke, "and the present situation confronting the railroads." Apparently referring to Soviet accomplishments, he warned that "we must institute crash programs' to speed up technology.

"To my mind the primary challenges confronting you, and to which transportation crash programs should be devoted, are the same old demands for passenger and freight services which are not being fully met. There's nothing new

(*Continued on page 18*)

Summary of Monthly Hot Box Reports

Month	Cars set off between terminals with Hot Boxes: System	Cars set off between terminals with Hot Boxes: Foreign	Miles per car set off
September 1953	6,083	10,195	173,376
September 1954	6,740	8,882	167,355
1955			
September	5,896	10,469	178,649
October	3,966	7,182	271,364
November	2,010	3,972	493,184
December	1,819	3,774	522,444
1956			
January	2,029	4,302	462,029
February	2,570	5,611	341,542
March	2,517	6,212	346,853
April	3,202	6,881	290,626
May	4,672	10,903	196,688
June	6,777	15,125	135,774
July	8,484	16,067	113,573
August	9,891	16,892	113,474
September	6,834	12,629	149,970
October	4,357	8,429	243,505
November	2,650	5,560	359,759
December	2,256	4,436	438,425
1957			
January	3,373	6,121	291,453
February	3,272	6,844	264,538
March	3,164	6,687	307,306
April	3,949	8,447	228,493
May	6,580	12,691	154,387
June	8,285	16,277	115,749
July	10,438	18,819	96,064
August	9,662	17,639	109,839
September	6,736	12,066	147,694

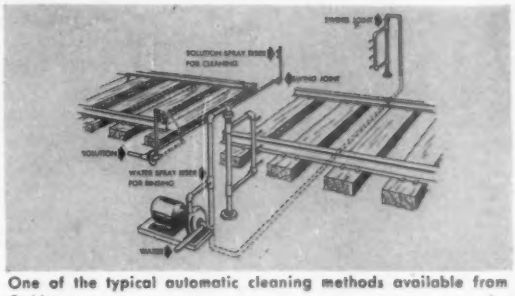


Original pressure-spray cleaning by Oakite cuts equipment-washing costs

Almost TEN years ago, Oakite FIRST pioneered the so-called pressure-spray system of cleaning and rinsing locomotive running gear and passenger cars. Today, many leading railroads are using this dependable Oakite system as standard procedure.

Above, you see the Oakite system in action. This sturdy washing unit was built to specifications from Oakite blueprints. Entire unit was fabricated in the railroad's own shops.

Today, you can cut your equipment-washing costs by specifying Oakite pressure-spray cleaning and rinsing systems and by selecting any one of a wide variety of specialized Oakite cleaning compounds.



One of the typical automatic cleaning methods available from Oakite.

Drawings and data of time-proved Oakite pressure system cleaning are yours for the asking. Drop a line to Oakite Products, Inc., (Railway Division) 46 Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE®

MATERIALS · METHODS · SERVICE

SCIENCE

Export Division Cable Address: Oakite

Oakite gives you the IMPORTANT advantage ... LOW-COST END RESULTS!

RAILWAY DIVISION

(*Continued from page 16*)

in the challenges themselves," Mr. Clarke stated. "People want to travel faster, more comfortably, safer and at a reasonable cost.

"Shippers want to move freight farther more dependably, with less bother—and at a reasonable cost." Automation may be one of the answers for the railroads in seeking to meet the challenges they face as the commissioner sees it. To him, railroading seems the type of transport "most susceptible to improvements in productivity" through developments in this area. Technical men have a responsibility, he asserted, to know traffic and other problems and "to sell management on how your ideas will improve overall service."

F. L. Murphy, vice president, Pullman-Standard, assumed the position of ASME Railroad Division chairman for 1958 at the December meeting.

1957 Car Orders Top Previous Year

Orders for domestic freight cars placed in 1957 ran 10.9 per cent ahead of the 1956 figures through the end of November. Car deliveries boomed in 1957. Since World War I, only the totals of 1948, 1925, 1924 and 1923 were greater than the 1957 delivery totals.

Orders and deliveries of domestic equipment reported by the American Railway Car Institute through the first eleven months showed the following:

	1956	1957
Car orders:		
Car builders	27,205	19,900
Railroad shops	7,866	19,048
Total	35,107	38,948
Car deliveries:		
Car builders	38,230	52,704
Railroad shops	21,590	40,187
Total	59,820	92,891

Pennsylvania President J. M. Symes warned recently that railroads "need to order 85,000 to 100,000 new freight cars a year for each of the next ten years just to correct obsolescence and increase our fleet." Orders placed during each of the past two years were less than half of the annual figures suggested by Mr. Symes.

Maintenance of the existing car fleet was reflected in the bad-order figures which jumped from 4 to 5 per cent of the total during the course of 1957. Total railroad car ownership went up by 35,000 units during the 12-months' period, reflecting the high production of cars both by builders and railroad shops.

New Books

ASTM STANDARDS ON COAL AND COKE. 140 pages. A compilation of the numerous ASTM methods of testing, definitions and specifications for coal and coke, and the standard specifications for the classification of coal according to rank and grade. Contains 21 methods of test, four specifications and three definitions. *American Society for Testing Materials, 1916 Race st., Philadelphia 3. Price, $2.50.*

Selected Motive Power and Car Statistics

• Freight Service (Data from I.C.C. M-211 and M-240)

Item No.		Month of September		9 months ended with September	
		1957	1956	1957	1956
3	Road locomotive miles (000) (M-211):				
3—06	Total, Diesel-electric	35,162	36,185	330,552	332,825
3—07	Total, electric	687	713	6,243	6,548
3—04	Total, locomotive-miles	1,229	1,432	357,903	376,929
4	Car miles (000,000) (M-211):				
4—03	Loaded, total	1,574	1,715	14,506	15,114
4—06	Empty, total	942	892	8,600	8,399
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—03	Total in Diesel-electric locomotive trains	106,541	107,590	976,323	959,676
6—04	Total in electric locomotive trains	2,180	2,311	19,773	20,317
6—06	Total in all trains	115,951	122,562	1,064,224	1,086,528
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	43.9	44.8	43.3	43.0
10—03	Empty freight car-miles	26.2	23.3	25.6	23.9
10—04	Total freight car-miles (excluding caboose)	70.1	68.1	69.9	66.9
10—05	Gross ton-miles (excluding locomotive and tender)	3,232	3,203	3,176	3,094
10—06	Net ton-miles	1,482	1,504	1,447	1,417
12	Net ton miles per loaded car-mile (M-211)	33.8	33.6	33.4	32.9
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	62.6	65.8	62.8	64.3
14	Averages per train hour (M-211):				
14—01	Train miles	18.9	18.4	18.8	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	60,026	58,236	59,026	56,869
14	Miles per diesel-electric unit day (M-240):				
14—01	Road freight units	205.3	—	209.3	—
14—02	Road passenger units	432.4	—	441.6	—
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	45.6	47.1	46.0	46.6
17—02	All	43.5	45.2	44.1	44.8
18	Average net ton-miles per freight car-day (M-240)	919	999	925	949
19	Per cent of home cars of total freight cars on the line (M-240)	109.9	111.8	110.7	112.0

• Passenger Service (Data from I.C.C. M-213)

3	Road motive-power miles (000):				
3—06	Diesel-electric	18,797	19,510	175,556	182,766
3—07	Electric	1,046	1,166	10,348	11,246
3—04	Total	20,113	21,317	188,689	200,874
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	206,323	223,176	1,939,004	2,081,180
4—11	Total in Diesel-electric locomotive trains	191,679	203,913	179,388	1,890,945
12	Total car-miles per train-mile	9.72	9.99	9.76	9.92

• Yard Service (Data from I.C.C. M-125)

1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,639,791	3,723,101	33,977,490	33,998,545
1—06	Total	3,779,424	3,975,090	35,422,072	36,397,111
2	Passenger yard switching hours:				
2—03	Diesel-electric[1]	231,965	240,620	2,162,889	2,223,292
2—06	Total	258,083	271,153	2,414,336	2,527,538
3	Hours per yard locomotive-day:				
3—02	Diesel-electric	14.9	15.6	15.3	15.7
3—05	Serviceable	15.2	15.6	15.5	15.7
3—06	All locomotives (serviceable, unserviceable and stored)	14.0	14.4	14.3	14.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.67	1.61	1.69	1.67
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locotives)	0.77	0.75	0.77	0.75

1 Excludes B and trailing A units.

Personal Mention

Atlantic Coast Line.—*Waycross, Ga.:* F. A. DELANO, special engineer, appointed supervisor car maintenance.

Boston & Maine.—*Boston:* P. C. DUNN appointed assistant general mechanical superintendent. Former position of superintendent of locomotive maintenance abolished.

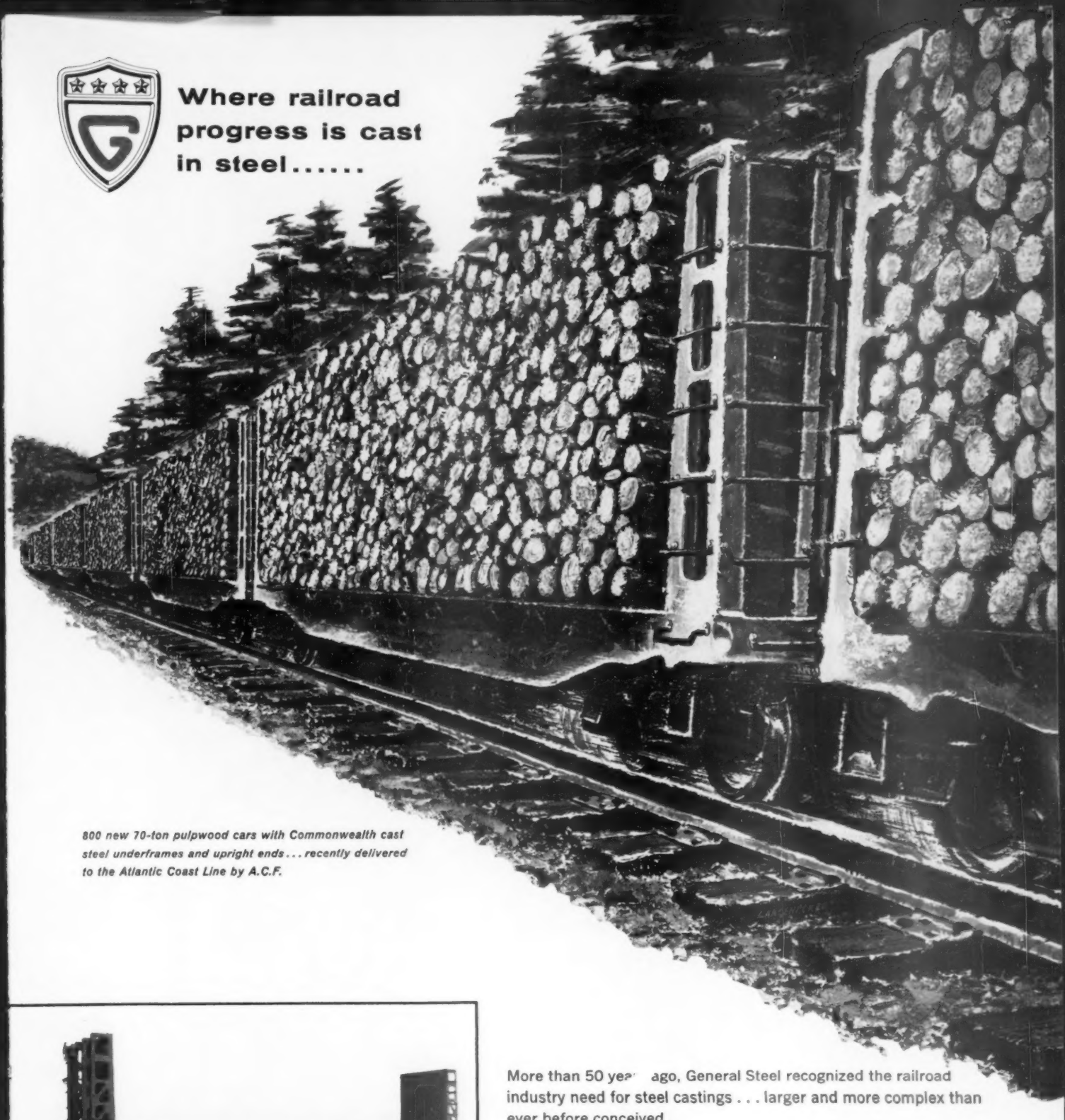
Canadian National.—*Moncton, N. B.:* ORA C. BISHOP, foreman, motive power shop, retired.

Chesapeake & Ohio.—*Russell, Ky.:* R. F. HICKS appointed general foreman, locomotive department, succeeding W. L. DEVANEY, retired.

Chicago & North Western.—*Chicago:* EARL L. WALSTON appointed to new position of general superintendent motive power and car departments. Started with Illinois Central as machinist apprentice. Subsequently became machinist, welder, loco-

(*Continued on page 63*)

Where railroad progress is cast in steel.....



800 new 70-ton pulpwood cars with Commonwealth cast steel underframes and upright ends... recently delivered to the Atlantic Coast Line by A.C.F.

Commonwealth cast steel underframe and interlocking upright ends simplify pulpwood car construction; provide greater strength, permit easier loading, maximum capacity.

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Plan wisely for the future . . . invest in Commonwealth products.

GENERAL STEEL CASTINGS

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NEW PLASTIC HATCH COVER and PLUG

- reduces weight 50%-60%
- twice as easy to lift
- won't rust or corrode
- better insulation

A new development from Standard . . . the reinforced Plastic Combination Hatch Cover and Plug. This product's inherent savings in maintenance time and money result from Standard's feeling of "responsibility" to produce new and better products for the railroads...a "responsibility" that pays-off for you.

Made of glass reinforced polyester resin, this new hatch cover and plug design cuts weight down to 65 lbs. including hardware and gasket . . . 70 lbs. *less* than the conventional plug. There's a big plus in the new ease of handling at the icing stations, too!

The Plastic Hatch Cover and Plug is suitable for either Standard's welded design or new integral design Hatch Frame and will not rust or corrode. Salt and brine have no effect. And the Plastic Plug's core of insulation gives greater resistance to heat transfer. Your own choice of hardware can be used.

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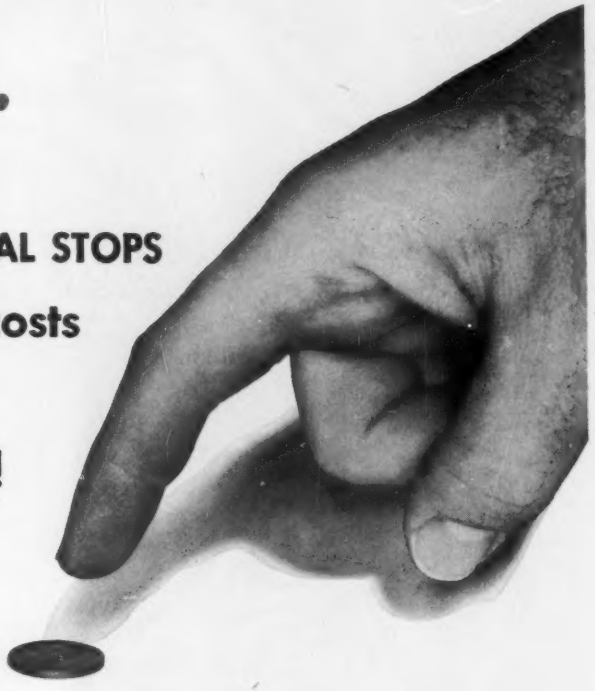
DEDICATED TO PROGRESS RPI MEMBER

HOW SOLID BEARINGS AND JOURNAL STOPS HELP KEEP RAILROADS OUT OF THE RED

It's a fact...

that MAGNUS R-S JOURNAL STOPS can cut total hot-box costs to less than 1 cent per car per day!



Operating experience with more than 5,000 freight cars proves that Solid Bearings and Journal Stops are the low-cost solution to the hot-box problem

Railroads using low-cost solid bearings and R-S Journal Stops today average over 6,000,000 car miles per hot box. Conservatively, new users of R-S Journal Stops can increase hot box mileage 10 times — can cut hot box costs to a tenth of current costs on similar cars in similar service. That means less than ⅓ cent per car per day to cover all costs associated with bearing road failures.*

That's just one of the facts about R-S Journal Stops, proved now on over 5000 cars in service. Essentially, they stabilize the bearing assembly, help provide uniform, uninterrupted oil film lubrication, give the solid bearing a chance to work at optimum efficiency.

Results: you double bearing life, reduce wheel flange wear, cut necessary service attention, prevent dust guard damage — in short, save on truck maintenance all along the line. This reduced maintenance alone will save you enough to pay for the Stops in 3 years.

And with R-S Journal Stops, you still have all the other advantages which low-cost solid bearings bring to railroad rolling stock. You can take the maximum load, make the fastest schedule. Lading gets the smoothest ride. You save excess dead weight and get lowest possible running resistance in pounds per ton. Best of all, you'll be sure of the kind of bearing performance you want at a price you can afford to pay. Write us for all the facts. Magnus Metal Corporation, 111 Broadway, New York 6, New York; or 80 E. Jackson Blvd., Chicago 4, Illinois.

*Cost based on data compiled by the Mechanical Division of the Association of American Railroads in 1955.

MAGNUS

Solid Bearings

Right for Railroads
...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

How Stabilized Employment Saves Money at Lehigh Valley's Sayre Shops

As the first major eastern road to replace steam operation with diesels, the Lehigh Valley also became the first to face the problem of improving shop efficiency to keep pace with diesel economies. Because the requirements of diesel maintenance differ so radically from those of steam, shop operations had to be drastically altered, both in kind and in quantity. The skills required changed—electricians are obviously more necessary to diesel-electric maintenance than boilermakers—and the work required far fewer men.

In 1946, the Lehigh Valley operated 322 steam locomotives and 59 diesel units. Today the road handles its traffic with only 223 diesel units, made up into 189 locomotives.

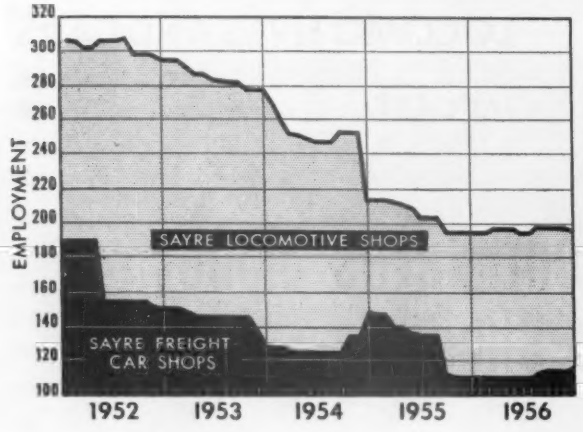
With 158 fewer locomotive units to be maintained now than 10 years ago, the LV locomotive forces are necessarily much smaller than in the heyday of steam. Mechanized equipment, like the automatic wheel-truing machine, is used wherever possible to increase efficiency. Efficiency of the shop men has increased too. The present force has fewer helpers and more mechanics and apprentices in the highly skilled crafts.

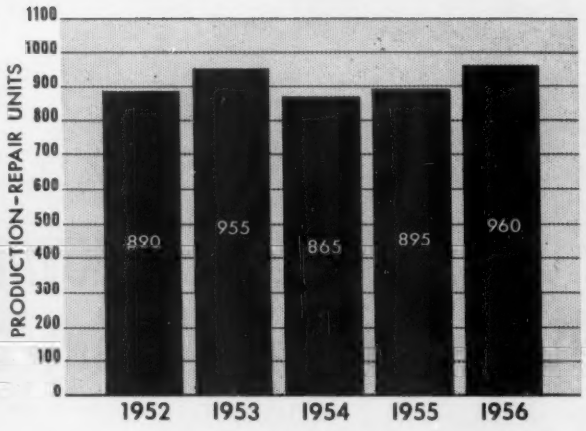
As the chart of shop employment at Sayre shows, there has been a steady down trend, but there has also been good stability at various levels, and the work force has tended to level off since mid-1955. The pattern shown on the chart is practical stabilization of employment, the LV and its mechanical department men feel. This kind of stabilization does not freeze employment at any given level; that would be both shortsighted and foolish with continually rising costs demanding ever-increasing efficiency for the railroad even to hold its own. This kind of stabilization does permit advance planning for using the whole work force efficiently and steadily from year to year.

How the Shift Was Made

As the shops have become more mechanized, shop-force jobs have been upgraded. The number of men employed in Sayre shops has decreased by 30 per cent since 1952, but the payroll has been cut by only 13 per cent in the same time. In making the transition from diesel to steam, a good many of the men whose crafts were no longer needed in quantity in the locomotive shop went into the car shop. A good many boilermakers, for example, qualified in carbuilding crafts and continued on the rolls, though with greatly

APPRENTICE TRAINING is essential part of stabilized employment program. D. T. Little, apprentice instructor, heads classroom work.





Figures for production are based on a total obtained by adding heavy and light car repairs and light locomotive repairs to a weighted figure for heavy locomotive repairs.

reduced seniority. Older men were urged to, and did, retire at 65 rather than wait to take their pension later. Men in crafts in demand who retired or died or left the payroll for some other reason were not replaced immediately, or were replaced by men from one of the steam crafts.

An apprentice training program provides enough trained men to take care of vacancies that have to be filled. The Lehigh Valley program was organized with the approval of the shopcraft brotherhoods and the Federal Apprentice Training Bureau of the Labor Department. The railroad makes every attempt to plan the program to graduate the right number of technically trained apprentices each year in the machinist, electrician and other crafts to fill jobs that come open that year. Under the system in force in the steam shops, new men qualified as helpers first. After a vacancy came up, they could be set up as machinists or in some other higher-rated classification. This system tended to keep the age level of the most skilled crafts rather high and meant that the railroad was not getting the full benefit of younger men with the most recent training. The present apprentice system qualifies men for the higher-rated crafts without requiring them to serve a period in one of the lower-rated crafts. Eventually, the apprentice program will produce in the shop force a balance between men with experience and young men trained in the most modern techniques.

At the present time, some 40 apprentices are undergoing training at Sayre. The men in the program are mostly high-school graduates, and most of them have been accepted because they show potential talents as future supervisors. In addition to regularly scheduled class work in the apprentice classroom at Sayre, apprentices must

LV M of E Ratio
Compared with Eastern and National Averages

Year	LV	Eastern railroads	All Class I railroads
1956	16.8	18.1	18.0
1955	17.2	18.1	17.7
1954	17.1	19.1	18.3
1953	17.7	19.6	18.6
1952	16.3	19.7	18.5

LV M of E Budget
Compared with Actual Expenditures

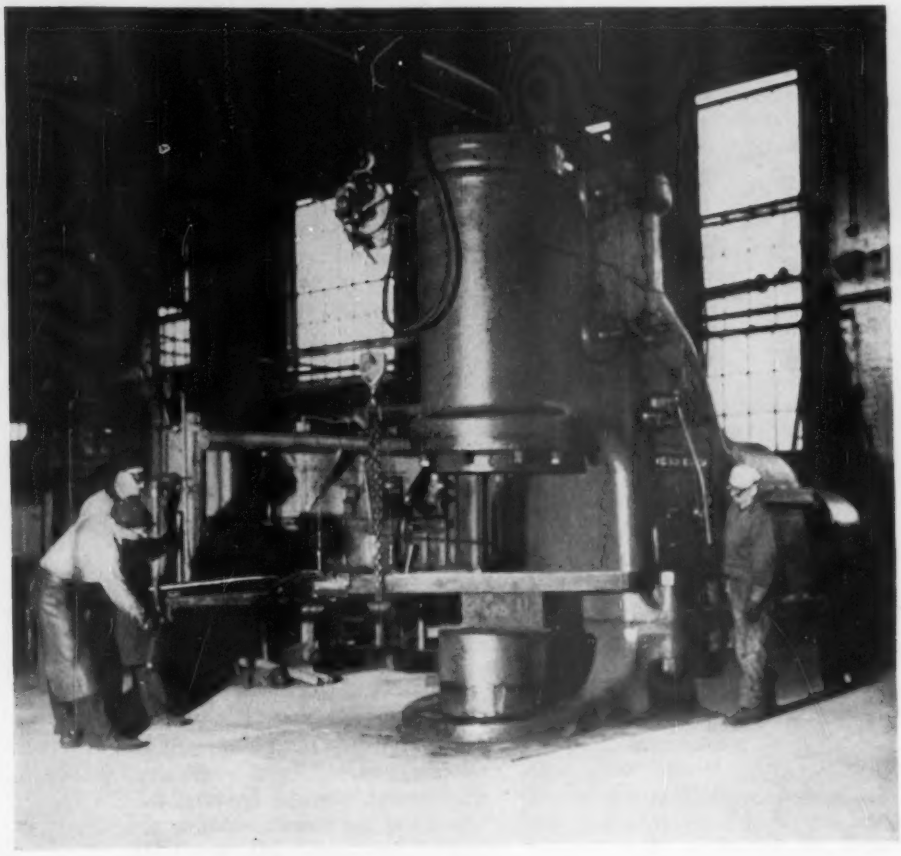
Year	Planned budget	Actual expenditures	Per Cent variation from plan
1956	$11,689,700	$12,050,821	+ 3.1
1955	12,282,500	11,851,078	− 3.5
1954	12,754,120	11,193,709	−12.2
1953	13,569,500	13,502,656	− 0.49
1952	12,742,400	12,806,459	+ 0.50

Comparison of Overhead (Shop Expense) with Labor Expense
Sayre Locomotive and Freight Car Shops

Year	Locomotive Shop Labor	Locomotive Shop Overhead	% Overhead to labor	Freight Car Shop Labor	Freight Car Shop Overhead	% Overhead to labor
1956	$554,495	$323,053	57	$420,897	$118,665	28
1955	556,083	297,564	54	453,062	132,743	29
1954	543,117	288,015	53	413,694	141,070	34
1953	662,447	338,522	52	497,336	225,529	46
1952	706,909	332,219	47	582,051	232,379	40

Lehigh Valley M of E Overtime
Compared with Total Wages

Year	Total M of E Wages	Total M of E Overtime	% Overtime to Total Wages
1956	$6,686,848	$161,156	2.4
1955	6,568,610	156,131	2.4
1954	6,508,845	131,699	2.0
1953	7,125,955	202,242	2.8
1952	7,256,710	207,536	2.9



REWINDING ARMATURES on traction motors is sometimes done by Sayre shop electrical force, sometimes by builder. Electrical shop handles normal program; peak loads are returned to factory.

MARINE REPAIRS for Lehigh Valley tugboat fleet are handled in Sayre. A 3,000-lb pneumatic forging hammer is straightening a marine toggle pin.

take—and pass—a lengthy correspondence course from the Railway Educational Bureau. W. E. Lehr, superintendent of motive power, keeps track of the apprentice program personally. If a man lets himself fall behind, in either the Sayre classes, or the correspondence course, he is asked by Mr. Lehr to account for his difficulty. If the explanation is not satisfactory, the offender is cautioned by an apprentice committee, made up of management and labor organization representatives. If there is still no improvement, his case is further considered and he is likely to be dropped from the program.

Programmed Maintenance

The backbone of stabilized employment in any mechanical department is programmed maintenance. On the Lehigh Valley, a schedule is established for all equipment to determine when its most economical renewal date will come. The railroad looks at the matter as a straight accounting proposition. Any given piece of equipment starts out with a balance of a certain number of miles of trouble-free operations; say for example, a locomotive has a mileage expectancy of 300,000 miles without needing major repairs. If you have 200 locomotives with this same mileage expectancy, the railroad has a total mileage expectancy of 60,000,000 miles without major repairs. Every train mile operated lowers this balance, and if all 200 of the locomotives were allowed to run off 300,000 miles each without having their mileage balance restored, the railroad might suddenly find itself unable to operate because all of its locomotives could be expected to fail at the same time. Programming locomotive and car maintenance puts the mileage balance back. By means of programming, mechanical officers can schedule repairs in advance of a major breakdown insuring equipment will be on hand to meet the needs of the traffic department.

A good program doesn't permit either cars or locomotives to keep running until they wind up on the dead track for emergency heavy repairs. Instead, it performs the necessary repair operations before the emergency occurs. A program of this sort also means that the motive power and equipment superintendent can budget the amount of men and materials he will need for a year, because he can forecast in advance with accuracy just how much work he will have to do during the year.

Budget—Planned and Actual

The traffic department and the executive officers of a railroad can plan with fair accuracy what their revenues will be for any given five-year period. In these estimates, they may make mistakes, but if they do, they will be in good company, since every other major industry in the United States will be forecasting its business expectations, most of them using the same data the railroads use. A one-year budget based on anticipated revenue can be drawn up with con-

siderable accuracy, barring emergencies. With the revenue figure on the one hand, and the requests of the various departments for money to carry out their programs on the other, the executive officers of the road can plan what percentage should go to maintenance of way, what to maintenance of equipment, what to operating, etc.

Individual departments will not always get what they ask for in their budget but budget cuts will be made well in advance of any actual commitment of men and materials to any given project. There will not be the enormous waste involved in shutting down a major facility for two or three months because monthly revenues are down, and then, when the facility is reopened, running it overtime trying to catch up with work that has necessarily been deferred.

Once a department budget is submitted to the executive officers, it is adjusted to the expected revenue, and also to fit the needs of the other departments. When the mechanical budget comes back to the superintendent of motive power it is still subject to review during the forthcoming year to adjust it to altered conditions, but it does give a reasonably accurate guide as to how much money will be available for maintenance during each month of the following year. This, the superintendent of motive power uses to plan his detailed schedule for accomplishing the production goals that have been set by his maintenance program.

Stabilizing Manpower

On the Lehigh Valley, variations in money available from month to month show up mostly in the money used for materials and stores; the manpower budget remains relatively constant. LV feels that it has an investment in its employees, just as it has in its labor-saving machines. The railroad invests about $12,000 in putting a man through the apprentice course, and it considers it just as important for this money to earn a fair return as for any other investment.

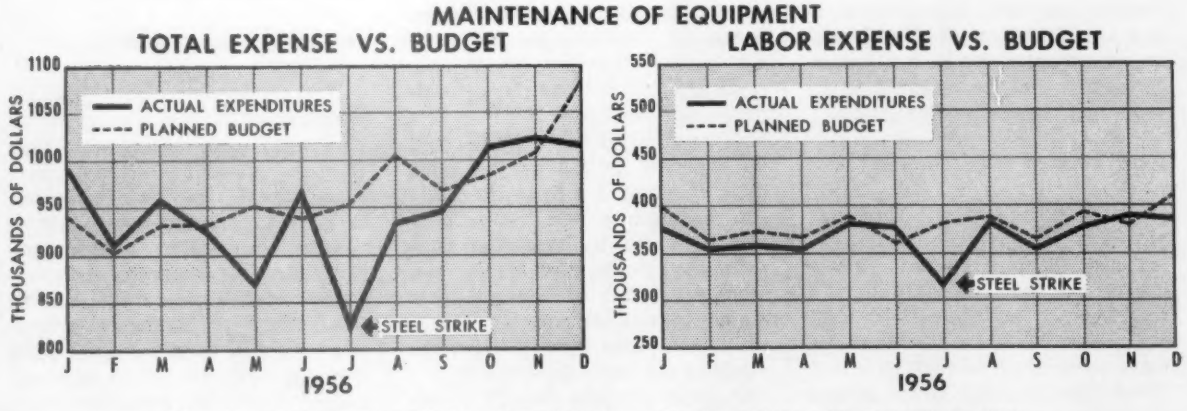
Stabilized employment on the Lehigh Valley has been accomplished through a smaller work force working steadily and efficiently throughout the year. It has not tended to freeze jobs at an artificial level, but it has created an atmosphere of job security that helps the railroad get and keep good men. The railroad likes it, and so do the employees.

Stabilized employment is possible largely because mechanical department work is programmed well in advance of the time the work is performed and because the mechanical department is operated on an annual budget rather than one tied to fluctuations in monthly revenue. This does not mean that the mechanical department spends more money in the course of the year than it would under a monthly budget; it does mean that the money can be spent wisely and more efficiently.

Monthly fluctuations in the work load are handled by setting the size of the work force at a figure large enough to handle normal requirements. Programmed maintenance means that there are few periods of less work than scheduled. When these occur, the shop is not shut down; instead, work is done in the shop—such as rewinding armatures or rebuilding engines—that might ordinarily go back to the manufacturer.

Moral of the Story

A stabilized mechanical department, like the increased automation that goes along with it, is an established part of the Lehigh Valley's program for increasing railroad efficiency to keep up with increased railroad costs. The principle of stabilized employment is not new; it has been accepted by progressive mechanical men for years. The files of Railway Mechanical Engineer (as Railway Locomotives and Cars was then called) for the 1920's are full of references to stabilized mechanical employment, but the financial difficulties of the railroads during the years following did not permit the principle of mechanical stabilization to become established. At this point in our financial history, with automation and increased efficiency hailed in most industries as the key to survival, the financial difficulties of the railroads raise a different question: Can mechanical departments keep their efficiency up and their costs down *without* mechanical stabilization?



Comparison of Actual M of E Labor and Total Expenses with Planned Budget, Month by Month, 1956.

BEFORE **AFTER**

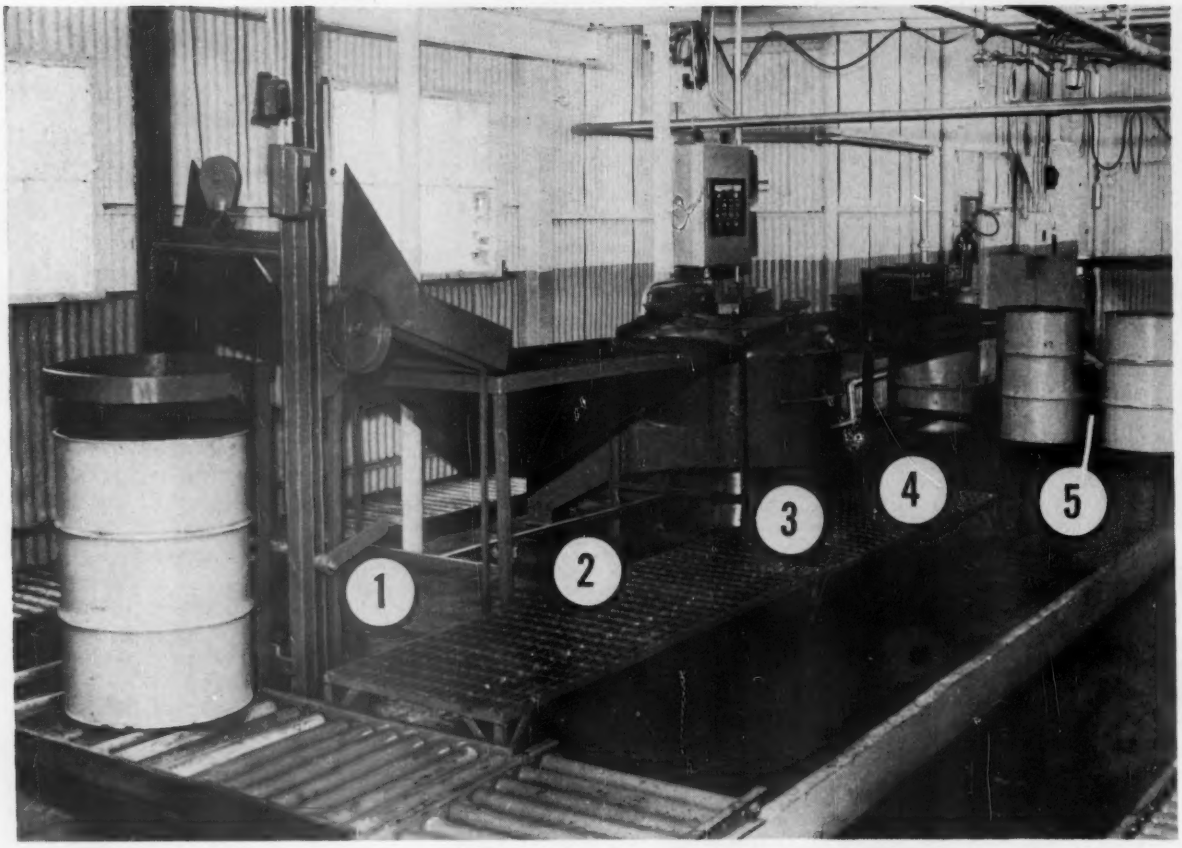
New Look for Santa Fe's 'Victory Gons'

In 1943, the Santa Fe purchased 400 drop-end, mill-type, 70-ton gondolas constructed to government specifications limiting the amount of steel. These specifications required use of wooden sides, decking, and floor stringers. The design was such that replacement with steel could be accomplished with a minimum of repair and change.

These cars are now being modernized at the Santa Fe's Topeka shops, by removing the wooden members and applying steel Z-bar floor stringers, N-S-F nailable steel floors, ¼-in. flat steel sides, and retractable lading anchors fastened to the top bulb angle. These changes increase the light weight of cars approximately 3,000 lb, but greatly increase their serviceability.

The steel floors are welded in place and the sides are riveted to original framing.

"Victory Gons" have new steel siding and retractable lading anchors.



Components of pad reclamation plant at Portsmouth, Ohio, include: (1) electrically-operated barrel dump to unload incoming drums of pads; (2) inspection and sorting table prior to loading into cleaning; (3) cleaning machine is combination agitator, washer and centrifuge, (4) final inspection table where pads are gauged for height and placed in drums for shipment; (5) underground reservoir and filtration system.

How N&W Reclaims Its Lubricators

The N&W has been a pace setter in installing journal lubricating devices to replace loose waste. Recently the road has been pioneering development of equipment for reclamation of these devices.

Currently there are 10 types of lubricators in service on the N&W. Among these, only one type has not been in service long enough to require reclamation. All of the others have been successfully reclaimed and the N&W anticipates no difficulty with the thirteenth type when it is due for cleaning.

The road now has two pad reclamation plants in operation. One is at Portsmouth, Ohio, and the other is at Shaffers Crossing shop at Roanoke, Va. Each of the pad reclamation plants has the same equipment. The Portsmouth installation is located in the N&W's only waste reclamation plant.

Washing is done in a machine which is a combination agitator washer and centrifuge. The cleaning solution is standard AAR specification car journal oil. It is used at a temperature between 220 and 240-deg F which range is used for cleaning all types of lubricators.

Actually the cleaning machines are owned by the Railway Service and Supply Corp. of Indianapolis. The N&W leases this equipment. Work done to date has been a joint experimental effort on the part of the railroad and the leasing concern to develop methods and modifications which will do the best pad cleaning job.

Much of the preliminary reclamation work was done on pads removed from cars caught in floods in Kentucky and West Virginia last spring. At that time, various methods for reclamation were tried, including the use of the N&W's existing waste reclamation plant. This work provided much of the ground work for the present equipment and processes. Because all methods of pad reclamation were experimental, the N&W made its decision to lease the cleaning machines it now operates.

Capacity of each of the reclamation plants is 78 car sets (624 lubricators) each 8-hr shift. At the present time there is not enough reclamation work to permit capacity operation for any sustained period. The two plants handle all the present reclamation requirements on an abbreviated schedule,

and it is anticipated that the two plants will be adequate when all N&W cars have lubricators. It is predicted, however, that it will be necessary to operate more than one shift per day at that time.

Two men must operate the plant to sustain maximum output. A complete three-step cleaning cycle for one load of 13 pads takes approximately ten minutes and is broken down as follows:

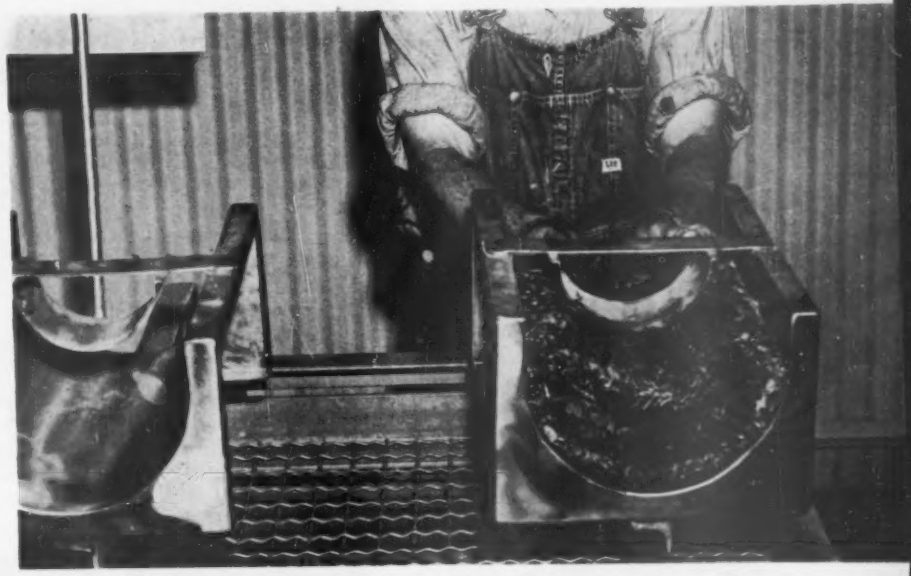
- Unloading pads with a barrel dump and loading the cleaning machine requires two minutes. Pads are dumped on a preliminary inspection and sorting table where excess oil drains away and where pads can be handled during the loading.
- The cleaning machine cycle requires six minutes. During this time the pads are first agitated through the cleaning oil and finally are spun to remove all oil.
- Unloading the cleaning machine; trimming loosened strands from the pads; gauging and inspecting them; and loading them in drums for return to line points requires two minutes. Pads are returned to the line points dry and are saturated with oil before again being installed in cars.

Practically all the pads are put through this cleaning process before any are scrapped. This recovers the oil they contain. There is a minimum of preliminary inspection, and only the very badly damaged pads are scrapped before reclamation.

All types of pads are reclaimed in the same way. Some types are damaged during cleaning. In a few instances the N&W has recommended changes to manufacturers to correct weaknesses which became apparent when their lubricators were reclaimed.

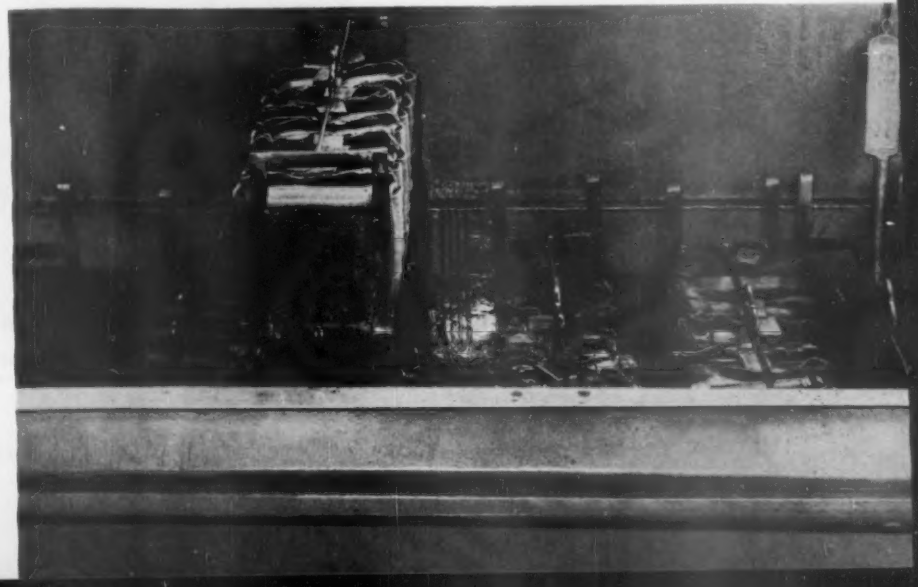
As yet, no satisfactory method has been developed by the N&W to repair torn pad covers, but some experiments have been conducted to determine possible solutions. Tests on the efficiency of the cleaning process are not developed sufficiently to report results, and the same situation exists with respect to cleaning costs. The N&W has reclaimed its own waste packing for the past forty years. From work done to date, there is every indication that pad reclamation will be done exclusively by the N&W too.

Reclamation of pads are readied for return to service. All types installed by N&W can be reclaimed.



Height check of pads is part of last stage of N&W's reclamation. Gauges are those specified by recently adopted AAR Specification M-910A-57, "Renovated Journal Lubricating Devices."

For good results pads must have complete, proper saturation with good car oil at right temperature.



WHAT THEY DO Stripped down inside and out, coach moves into shop for welding operations.

Face-Lifting by Heliarc Welding

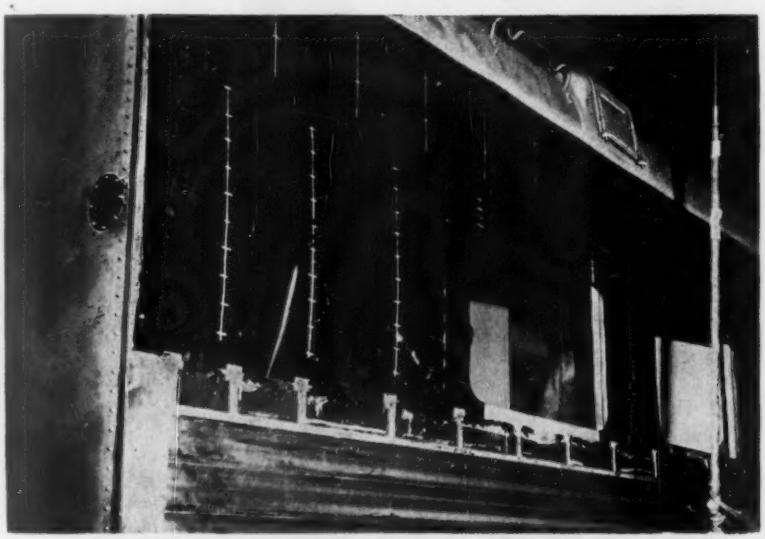
Lower maintenance costs and improved appearance feature siding repairs made to eleven passenger cars at the C&EI shops in Danville, Ill. The cars are eleven years old, and from the start had fluted stainless steel siding below the window sills. Above the sill line the sheathing originally was steel plate which required frequent painting. This painted area is now sheathed with 20-gage, 18-8 stainless steel. Cars repaired included eight coaches, two diners and one lunch-counter car.

After sand blasting, a special mixture of aluminum paint primer is applied before welding the stainless steel to the original sheathing. To anchor the new sheathing, the Heliarc spot welding automatic time cycle was set for three seconds. A ⅛-in. electrode and 130 amp ac welding current, with superimposed high frequency was used. This method — according to C&EI officials—is fast; produces clean welds; and only minimum weld finishing is required. Although welding can be done from only one side repairs were not difficult. Each section is marked to indicate to operator the proper location of welds.

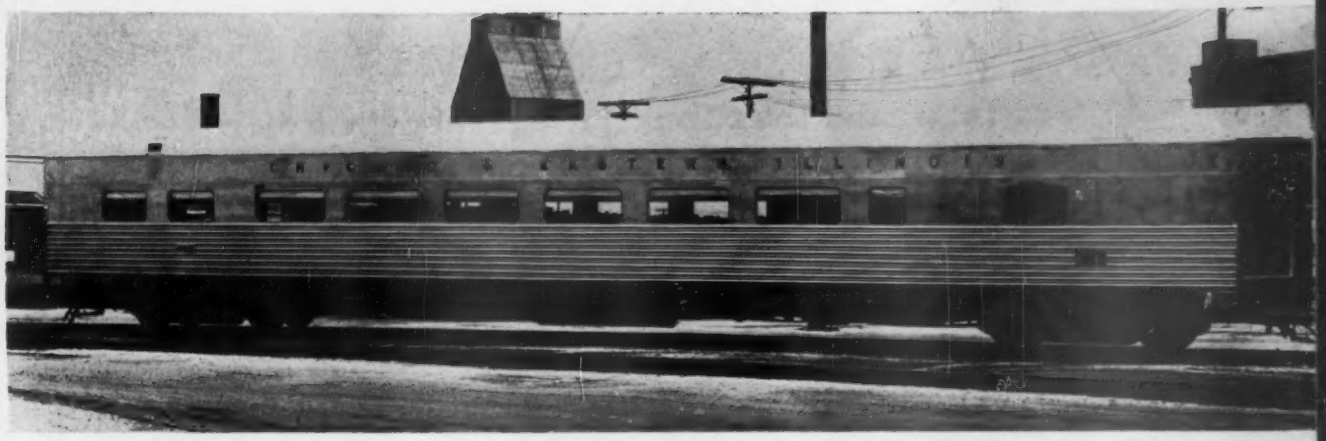
In making edge welds around each stainless steel window frame, heliarc fusion welding process is used. Before welding, the frame and side metal is clamped together. Using 110 amp. ACHF with argon gas shielding, the welding produced clean rounded weld beads where the frame is joined to the older side sheet. Approximately fifteen eight-hour days of fusion and spot welding is required on each car. Most of the welding is done by one operator.

The fluting was removed from the coaches and lunch-counter car and surfaces were sand blasted. Some corrosion was found which required patching, and the small support channels were rewelded. This surface is sprayed with 3M body undercoating EC-1412, about 3/32 in. thick for a preservative and to control noise. Fluting was reapplied with Cherry monel blind rivets. The fluting was partially removed below the window sills on the two diners for surface inspection, and to permit lapping the stainless steel upper sheathing. The lunch-counter car, originally all painted, was sand blasted, and new fluting and stainless steel siding applied.

Four coaches, previously observation cars, had their rounded ends



HOW THEY DO IT Location marks on new stainless side sheathing show points where Heliarc spot weld is made.



Completely modernized, with extensive use of stainless steel, this C&EI coach is now ready for service.

squared off, and Mars lights removed. Skirts were removed from coaches and lunch-counter car, but left on the diners. Platforms, trap doors and folding steps are rebuilt of stainless steel, and end doors and vestibule doors were replaced with Met-L-Wood stainless sheathed units. Pittsburgh sash was set in rubber seals in windows. Lifting lugs were applied to all cars.

All trucks were completely overhauled, and redesigned long-travel springs applied along with Houdaille snubbers. The Frigidaire air conditioning and all motors were overhauled. Zone heating was removed from four coaches and Vapor's newer Unizone applied. This was done to simplify the heating system. It is now necessary to maintain only one regulator instead of three. No change was made in the air brake system. The roofs of all cars were painted with Dulux exterior aluminum paint, and clear varnish was then applied. Heliarc welding has been used experimentally on roof sections to eliminate leaks.

Interior Materials

End panels, bulkhead partitions and panels between the windows in some coaches are covered with Styl-O-Vin impregnated wall fabric in various designs. Some murals and mirrors were removed for this application. Stainless steel wainscoting is now used above the pipe shields, and Resistal #302 embossed stainless wainscoting is used in passageways and in some toilets. The seats were re-upholstered over the original sponge rubber. Carpets were removed from diners, and replaced with Terraflex vinyl asbestos tiling in 9-in squares. Walls and ceilings are covered with vinyl fabric.

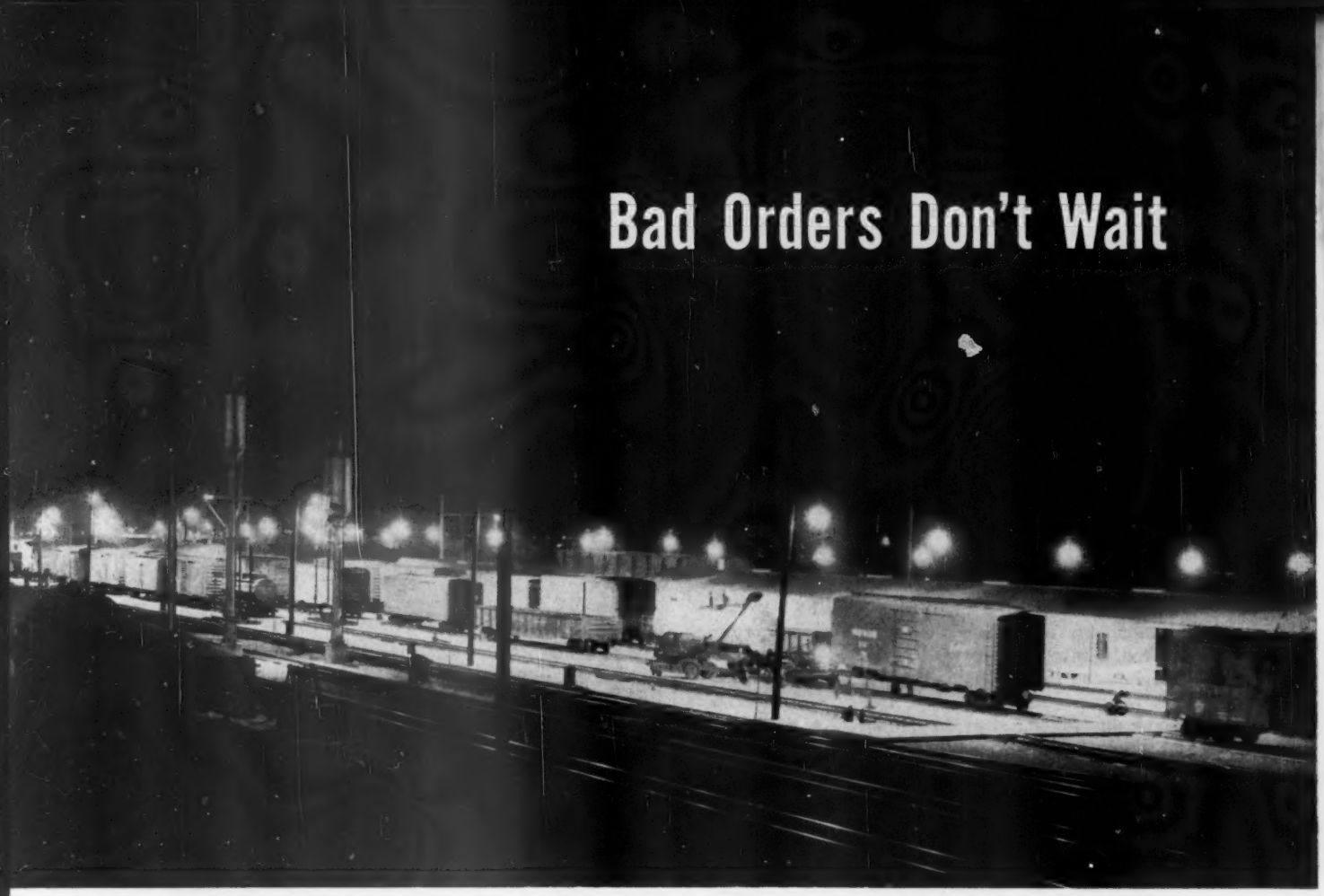
Candy, coffee-and-hot-chocolate, cigarettes, and refrigerated-sandwich-and-milk vending machines were placed in two of the coaches on an experimental basis. Power for the sandwich machine is provided by an alternator installed under car.

C&EI officials say the cost of complete rebuilding operation is about 12 per cent of the cost of a new car.

Clamps hold stainless window frame for 100% heliarc fusion weld to older side sheets.

Spot welding stainless understrip to sheathing is a fast and simple operation.

Bad Orders Don't Wait

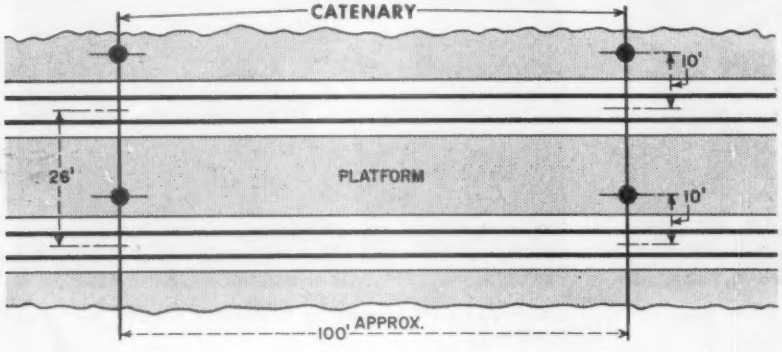


Night lighting in repair area permits full-time operation although RF&P finds that two-shift operation meets the pace demanded by connecting roads.

Potomac Yard's New Facilities and Operating Methods Speed Car Repairs

The new half-million dollar consolidated car repair installation at Potomac Yard, Alexandria, Va., and the new work schedules there, are making it possible for bad-order cars to be repaired and forwarded from 12 to 36 hours faster. This consolidated car repair operation is but one phase of a $5.5-million expansion which will speed the movement of all cars through this vital "gateway to the South."

Luminaires rated at 400-w are suspended over the platforms to produce illumination intensity varying from 2 to 8 ft candles. Ther illumination pattern necessitated the off-center location for these lights.



Potomac Yard, owned and operated by the Richmond, Fredericksburg & Potomac, is located just south of Washington, D. C. Not only is the classification of RF&P trains accomplished there—principally cars for or from the Atlantic Coast Line and Seaboard—but also classified are trains for and from the Baltimore & Ohio, Chesapeake & Ohio, Pennsylvania, and Southern.

New yards and new operating methods on these proprietary lines are making it necessary to rebuild Potomac Yard so that it will continue to be in step with the expedited freight operations of all six railroads. When completed, both northward and southward yards will have increased track capacity and will be completely automatic.

A first step in this big overall

(*Continued on page 50*)

ELECTRICAL SECTION

Mastiff and chihuahua—The engineman looks down from the cab of the 8,500-hp gas-turbine-electric locomotive.

UP 8,500-Hp Turbines Ready to Roll

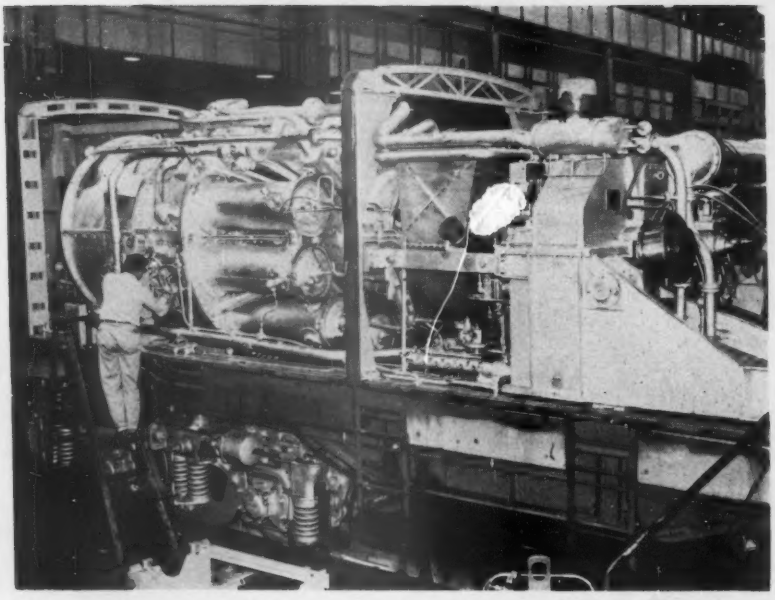
Locomotives can haul 5,000-ton train 1,811 miles from Los Angeles to Omaha with only two intermediate stops for fuel

THE FIRST OF FIFTEEN 8,500-hp gas turbine-electric locomotives for the Union Pacific is now practically completed. The locomotives were ordered from the General Electric Company late in 1955. The original design was described in the January 1956 issue of *Railway Locomotives and Cars* and component parts were described in the July 1957 issue. Information on the completed design has been made available in a paper by F. D. Gowans, General Electric Company, presented before the December 1-6, 1957, annual meeting of the American Society of Mechanical Engineers.

The 8,500-hp gas turbine locomotives were designed and built on the basis of experience gained from the operation of 25, 4,500-hp units, the first 10 of which went into service in 1952. The Union Pacific still has a large number of steam locomotives operating between Ogden, Utah, and Cheyenne, Wyo., which it wishes to retire. For this purpose they have wanted a locomotive with more weight on drivers and a higher horsepower-per-ton ratio for the purpose of handling high speed, long distance freight.

All these factors are embodied in the new locomotive. It consists of two units and a fuel tender. It is 175 ft long overall. It has 828,000 lb on drivers, and will handle a 5,000-ton train at 17 mph, on a 76-mile, 1.14 per cent grade. Geared for 66 mph, it has 20 hp per ton of weight on drivers as compared with 16 on the 4,500-hp locomotive. Speed at continuous rating is 18 mph.

The A unit is essentially an auxiliary. It carries an auxiliary diesel



No aisles or runways are possible in the B unit since the diameter of the turbine is 10 ft.

engine, a cooling system for the engine and the gas turbine lube oil, two air compressors, air brake reservoirs, control, a 2,500-gal fuel tank which supplies the diesel engine at all times and the turbine during starting, and other auxiliary components. The only main power components in the A unit are the six traction motors, control for these motors and braking resistors for eight traction motors.

Other main power components: the gas turbine generator set, six traction motors, control for these motors and braking resistors for four motors, are arranged in the B unit. Each unit is carried on two three-axle trucks with all axles motored.

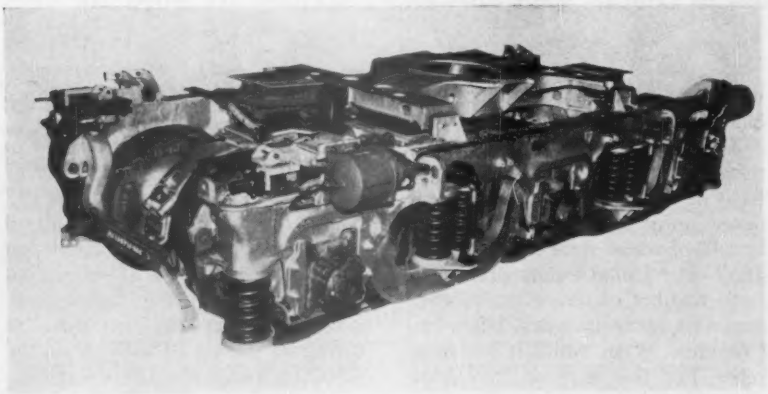
Heavy fuel for the gas turbine is carried in the tender coupled to the rear of the B unit.

With the main power source, gas turbine, and generators located in the B unit, it is necessary to connect power circuits between units in order to supply the traction motors and dynamic braking grids in the A unit. These connections are arranged in panels on each side of the end doors with quick disconnects so they can be uncoupled easily. Electrical control, a diesel fuel line, two water lines and the usual air brake lines also connect between these two units. The fuel line supplies diesel fuel to the gas turbine during the starting cycle, and the water lines connect the turbine lube oil cooler on the B unit to the radiator system on the A unit to consolidate the cooling system. These 2½-in. lines are located at the roof section. The flexible hose connections are supported in horizontal loops to give the flexibility and radii necessary for this size hose.

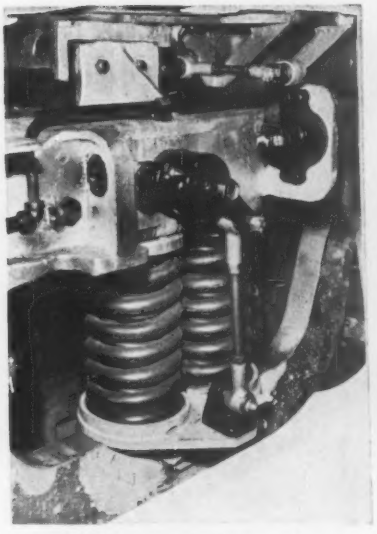
Connections between the B unit and the tender consist of the heavy fuel oil supply and return line, electrical connections for heating and lighting the tender and a tracer line for keeping this fuel line warm.

The diameter over the turbine casing in the B unit is 10 ft, requiring the full width of the cab to accommodate it. The four main generators are supported on a platform integral with the turbine gear case in order to simplify the alignment problem and to allow a completely integral power plant design. The overall length of the power plant, from generator to turbine exhaust tail cone, is 41 ft. Because of the unusual length of the unit, and the deflection and twisting normally encountered in a locomotive platform, the method of support is of considerable interest. The generator gear unit and the turbine are inter-connected and mounted on the platform by means of a flexible shaft coupling and a dual three-point casing support arrangement. This connection permits twisting of the turbine with respect to the generator gear unit while maintaining alignment. Two flexible legs support the generator gear unit on the platform, and a centering pin in the plane of these legs engages a recess in the platform to take the buffing and coupling shocks. Two flexible legs and a key support the turbine unit to the platform. The legs are welded to the platform and support the generator gear and turbine units by means of trunnion bearings attached to the lower casings. The legs are flexible only in the longitudinal direction; laterally they are quite stiff. The purpose of the flexible legs and the key is to permit freedom of longitudinal movement of the entire unit around the buff pin to care for expansion and contraction with temperature changes.

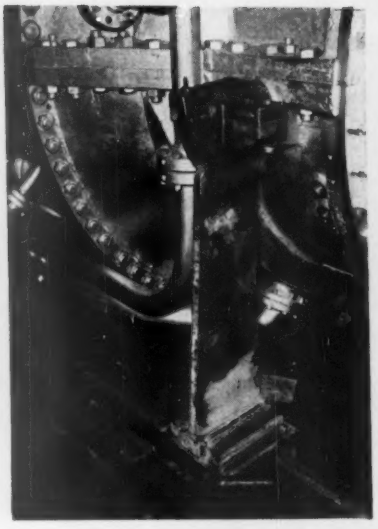
The angle of the exhaust gas tail cone, 30 deg upward from the horizontal, adds to the overall length of the turbine, but is a means of improving the locomotive performance. In addition, difficulties encountered from exhaust gas recirculation in tunnel entrances will be largely overcome. The 4,500-hp locomotive must travel 2.3 mph faster than the air in a tunnel of 410 sq ft cross section, in order to avoid any re-



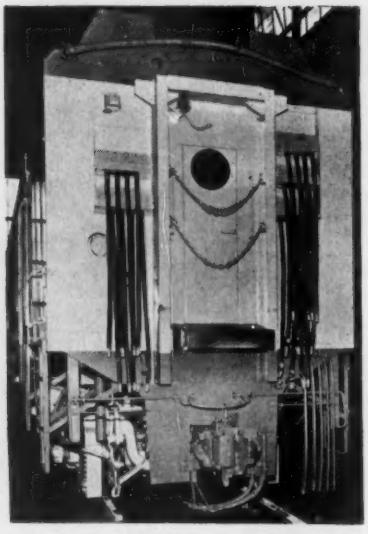
The truck bolster is supported on four rubber pads. Stability of the truck is maintained by shock absorbers between bolster and side frames. Tractive and buffing forces are carried from the bolster to the truck frame by lugs on the bottom of the bolster.



Detail of one of the trucks showing the hydraulic shock absorber.



Flexible leg and trunnion for supporting the turbine from the platform.



Rear end of the A unit showing connections between cabs.

circulation of exhaust gas. The 8,500-hp locomotive needs to run only 1.4 mph faster than the 4,500-hp locomotive to achieve the same performance at the tunnel entrance. The higher horsepower capabilities of the new locomotive enable it to run 25 per cent faster with its rated tonnage than the 4,500-hp locomotive.

Platform and Cabs

Removing heavy fuel from the locomotive to the tender and designing for a nominal 68,000 lb per axle, required that considerable weight be built into the A unit structure, since this unit, which would normally carry the fuel, now carries auxiliary equipment only. Structure numbers and sheets are heavier than would ordinarily be required and the top and bottom plates ofthe platform are 1½ in. thick. Based on usual design practice, there is 80,000 lb built into the unit for ballast alone.

In contrast to the A unit, the B unit structure, with its 150,000 lb of power plant, has been designed very carefully to meet the specified axle weight. High tensile steel is used in the sills, deck plate and draft gear housings. The sills have been reinforced by means of a fish belly 12-ft long at the center of the span to maintain normal platform deflection and to accommodate the turbine lube oil sump and traction motor air duct to the rear trucks.

On the A unit, all the cabs are welded and become an integral part of the platform. However, the two end cabs are not fastened to the center cab. These joints are left free so that the loading and buffing stresses will be confined to the platform and not transferred into an integral cab structure.

On the B unit, only the front and rear cabs are welded integrally with the platform. The center cab, housing the power plant, is made up of a top and two side pieces. These are bolted to each other and to the platform. Any part can be removed independently of the others for work on the power plant. If desired, all the three pieces can be removed as a unit from the platform for removal of the complete power plant.

It was considered essential in a high-speed freight locomotive of this type, geared for 66 mph, to have a swing bolster truck. The bolster is supported on four rubber pads. These pads are built up of alternate layers of rubber and steel bonded together. Flexibility of the rubber in shear permits lateral motion of the bolster within design limits. The resisting force built up in the rubber as it moves sideways tends to restore or center the bolster when the lateral force is removed.

Tractive force and buffing force are transmitted from the bolster to the truck frame by means of lugs on the bottom of the bolster which engage the cross ties between the truck side frames upon which the bolster is supported.

Stability of the truck is maintained by means of hydraulic shock absorbers between the bolster and side frame and the equalizer and side frame.

All controls for starting and stopping the diesel engine and the gas turbine are located in the A unit. An engine panel with the necessary controls and indicators is mounted near the diesel engine, as is customary on diesel-electric locomotives. Controls for the gas turbine are located at the engineman's position. After starting the engine, these controls permit the engineman to hostle the locomotive using the diesel engine-generator connected to two traction motors. Speeds up to 20 mph can be obtained with the locomotive and loaded tender on level track. This feature provides for minimum operation of the turbine at idling and light-load conditions. Considerable saving in fuel is thereby realized at yards and terminals.

The turbine is started on diesel fuel because it is easy to ignite and is more fluid than the heavy oil at low temperature. The engineman simply pushes the starting switch. A pneumatic, cam-operated controller automatically controls the starting cycle, brings the turbine to idle speed and then switches from diesel to heavy fuel. It likewise controls the stopping cycle. Switching back from heavy to diesel fuel, it flushes the heavy fuel from the lines and stops the turbine.

6 Roll Them Out Like New

Cleaning Electric Machinery

Abrasive Scrubbing

The problem of dealing with embedded and mechanically adhering dirt on insulation has resulted in another cleaning method. This is the abrasive or scrubbing method, and is particularly suited to removing strongly adhering dirt particles. In this method a blast of air entrains some sort of abrasive material which strikes the insulation with a scrubbing action. Aluminum oxide powder, or sand; pellets such as corn meal, ground corn cobs, or walnut shells; or other suitable material is used.

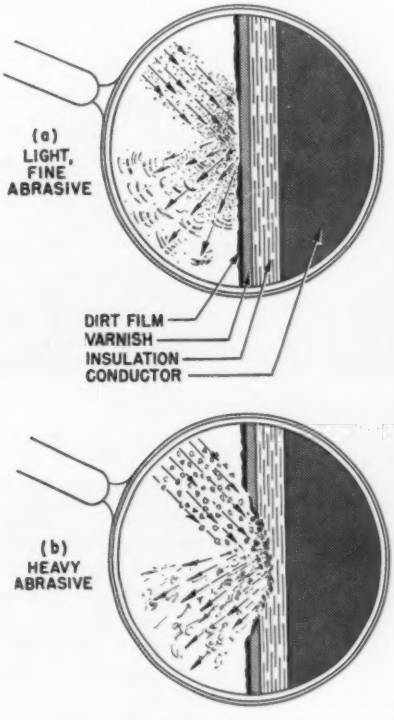
This is a powerful cleaning tool and you have to be cautious with its use or you may get into trouble. Both the air pressure and the size of the particles must be carefully selected to avoid damage to the insulation. Heavy abrasive particles driven by powerful air jet will not stop after removing the dirt. They go on and cut through the protective varnish coat and rip the insulation to shreds, Fig. 8. On the other hand, heavy soft pellets driven at high speed will pound the surface. Although they may not cut, they may loosen the bond between layers of insulation. As a general rule, the higher the pressure and speed of the air jet the finer must be the size of the abrasive particles. With fine flour-like powder the air pressure can go as high as 90 lb. Only small amounts of powder should be mixed with the air. A nozzle approximately ¼-in. in diameter may be best with the fine abrasive. This lets you direct the jet into pockets and hard-to-reach places. Larger, heavier particles, such as ground corn cobs, may work best with air at 40 to 60 lb. pressure. These coarser particles may take larger nozzles—⅝ to 1 in. in diameter. The fine, flour-like particles mixed with large quantities of air are probably best for removing the thin, enamel-like film of grime or dirt adhering mechanically to the insulation surface. The fine particles are not very effective against heavy layers of grease and muck. These should be removed with solvent, or by washing, before the abrasive blast is applied. Larger particles, such as ground corn cobs are more effective in removing thicker layers of grease and muck.

Before the days of abrasive blast the imbedded dirt was usually removed by stripping off the paint or varnish with chemical paint removers. This was costly and dangerous, and usually resulted in rebuild-

(*Continued on page 40*)

This is the sixth article in the series covering heavy maintenance of locomotive electrical equipment, and the concluding chapter on cleaning.

Part 6 is written by J. W. Teker, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.



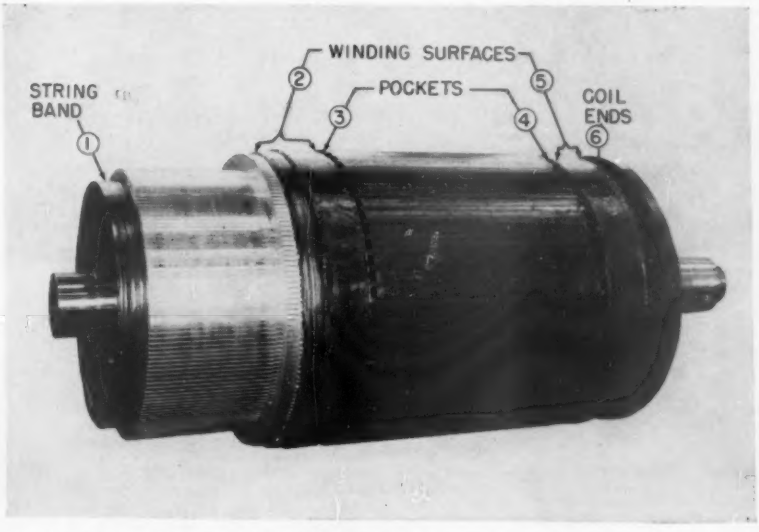
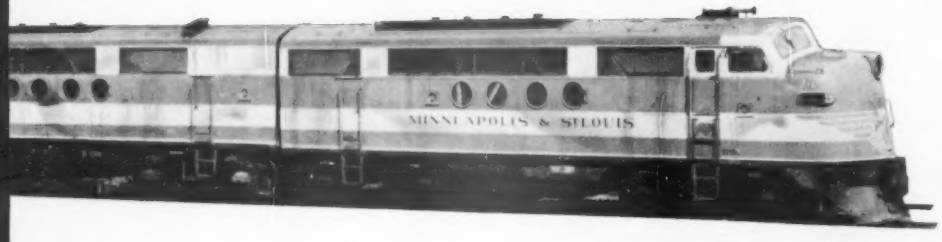


Fig. 8 (At left)—Good and bad air blasting practice

Fig. 9 (Above)—Typical sequence for systematic cleaning of an armature.



First units in the M. St. L. plan were the six oldest freight locomotives replaced with six General Purpose units. Subsequently, the second oldest group, consisting of freight units (like the one at left) has been turned in for versatile General Purpose units. Above are two of the General Purpose locomotives at work on the railroad today.

New locomotives for old . . .

The Minneapolis & St. Louis is building a new future from old freight locomotives by turning them in for new General Purpose locomotives containing certain remanufactured components. The advantages of higher horsepower and greater versatility are obtained at a cost substantially less than that of completely new units. Year by year, the M. St. L. plans to continue this program with additional older units as they too reach maturity.

How this or similar plans might benefit your roads' future can be had in detail from your Electro-Motive representative.

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ing the machine. The abrasive blast in the hands of a skilled worker is a very effective way to clean insulation. However, it also has its hazards. The operator should be protected with suitable respirators and goggles to keep the fine abrasive out of his eyes and lungs. Materials, such as corn meal must be kept dry or they will get lumpy and clog the machine. Also, they must be kept in tightly closed containers to prevent rats, mice and insects from getting at them. Corn cob grits, which are larger and have little food value, might be easier to store. Vendors of this equipment and material can make helpful suggestions as to the best selections for a given purpose.

The abrasive particles wear out nozzles. As with any tool, these require periodic maintenance and replacement. Like other means of cleaning, the abrasive blast method should be kept separate from the rest of the shop. This prevents the sharp abrasive material from spreading through the shop with resultant damage to machine tools and exposed equipment, and increase in the difficulty of good housekeeping.

One of the problems with this cleaning method is to know when to stop. Dirty surfaces are usually dark in color. As the dirt is scrubbed off by the blast, the normal color of the paint or varnish begins to show up in the clean areas. The color will, of course, be somewhat dull—not glossy like a new machine—because of the scrubbing or sanding action of the blast on the surface. Incidentally, this is a good preparation for the new varnish coat the machine will doubtless get before it leaves the shop. In addition to judging the appearance, the insulation resistance should be measured. Since the machine is dry and at room temperature the actual values specified for good insulation should be attained.

It is best to go about the cleaning job systematically, Fig. 9. For instance, in working on the armature, first clean the string band surface between the end of the commutator and the bead ring of the steel commutator cap. Next clean the surface between the commutator risers and the armature core. Pay particular attention to the pockets where the winding enters the core slots. Finally do the surface of the winding at the pinion end. There should be a definite change in insulation resistance as each of these surfaces is cleaned. Sometimes you may have to remove the armature steel bands and insulation to get at the dirt which may have accumulated under the bands. In any case this is probably desirable, for armatures can always stand a tightening of the bands.

Some of the areas of adhering dirt can be amazingly conductive. After a whole armature has been cleaned, the insulation resistance may still be low only because a hard-to-reach place has been overlooked. It is a good idea to have the armature arranged so it can be rotated as the work progresses. In this way the pedestal or supporting blocks do not interfere with the blast.

A general over-all dirt film presents many paths for electricity to leak across insulation surfaces. Hence, insulation resistance is low at first. As surface after surface gets cleaned up the escape paths become fewer, and the resistance should steadily increase. It's no use to go on blasting a surface that is already clean. Remember, there's no magic in blasting—it's what the blasting does that counts. If the insulation resistance stays low, there may be an electrical fault in some inaccessible part of the winding, such as an armature slot or commutator insulation.

Other Points to Watch

Dirty insulation that has been painted over is always a bad actor. There's a strong temptation to paint over insulation that is hard to clean. Sometimes this is done during running maintenance when the locomotive is urgently needed in a hurry. It makes the insulation look better but doesn't improve the creepage resistance. Electricity will continue to flow through the dirt even though it is under a layer of new paint. The painting job has only made it harder to get rid of the dirt. In fact, the part may have to be rebuilt, and that's serious. It would have been far better to let the insulation stay dirty until it could be properly cleaned. In any case, get to the bottom of the trouble. See that the insulation is clean and the resistance up to normal before doing any repainting or resurfacing.

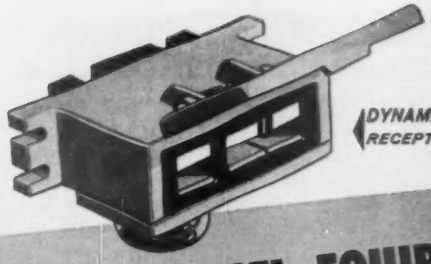
Another frequently overlooked cleaning job is the air holes running through the armature core. In service, these get clogged with dirt, and the flow of air is restricted. Ultimately the equipment overheats. Ordinary cleaning methods are not likely to take care of these air holes. You have to give them special attention. Flakes of varnish, or even leaves and paper sometimes get caught in these passages and shut them off completely. It's a good idea to push a rod through the holes to break out any obstructions. This should be followed by a good cleaning to make sure the passages are ready for another term of service.

Ultrasonic methods of cleaning are yet in their infancy as far as railroads are concerned, although they have found considerable application in specialized industries. Most of the present applications are in the cleaning of small parts. These methods employ high-frequency electricity to produce extremely rapid oscillations in a cleaning solution. This sets up alternate high and low pressure waves in the liquid which mechanically scrub parts placed in the solution. Regular solvents or cleaning solutions may be used. The vibrations mechanically assist the cleaning action.

Find the Source

Prevention is better than cure, so anything that can be done to prevent insulation from getting dirty is better than cleaning the dirt off later. Along with its cleaning operations, a shop should study the nature of the dirt found in machines. Sample it to find out what it is, and determine where it comes from. Then see what can be done about controlling or eliminating it. For instance, there may be negligence in the installation and maintaining of air filters. Oil or engine exhaust leaks may not have been located and corrected properly. Another thing—study the air-flow pattern in the locomotive. See that it draws dirt away from rather than toward the electric equipment. These are some of the ways in which repair shop people can cooperate with the running maintenance group to make a hard-hitting team that will improve the maintenance and performance of a railroad.

LOOK FOR THIS MARK OF QUALITY!



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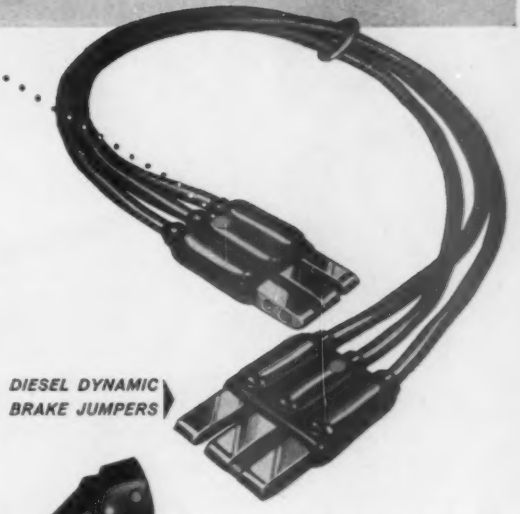
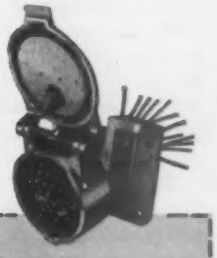


DIESEL DYNAMIC BRAKE JUMPERS

CONTROL JUMPERS

CONTROL RECEPTACLES



Note flexibility, illustrated by knot tied in cable.

Get the facts on these Products in... B64

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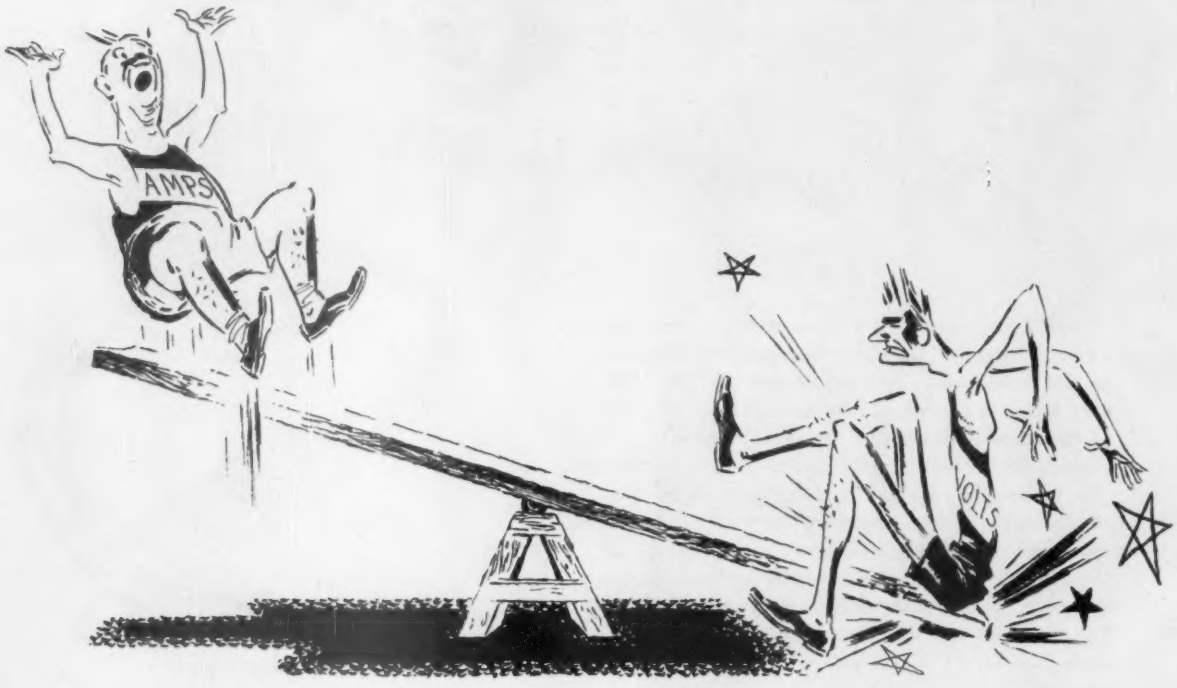

When Amps Go Up Volts Go Down

By Gordon Taylor

A main generator on a diesel electric locomotive had been very badly damaged on the SP&W due to a very destructive flashover. The flashover had been so destructive that it was felt that some unusual condition had existed to "trigger," or spark the flashover.

Our experience had taught us that a flashover usually occurs when a high voltage peak places the electric power system under such intensity of electrical pressure as to cause a current to flow over whatever leakage path may exist between two points of opposite polarity.

The spots most favorable for a flashover to start, are around the brushholders and the commutator of main generators and traction motors. It has been said "Fire makes room for itself." That is doubly true for the fire from the arc of an electrical flashover. On making room for itself the flashover brings damage to anything in its path. In this case the generator commutator and the armature windings had been so badly damaged as to require complete rewinding.

Our study of this case indicated that we should focus our attention on what might cause high voltage peaks to exist; which in turn would trigger a flashover across a leakage path.

The study was rewarded by our finding that the traction motor shunting circuits were inoperative. As a result, the motor fields were not being shunted during transition. This permitted high voltage peaks, that would not have existed, had the shunting circuits been closed at the proper time.

Some wiring changes in the control system had made field shunting inoperative. This was quickly remedied, and when a new armature was applied, the locomotive was back in business. This case did reveal the importance of field shunting, its purpose and how accomplished.

Many maintainers know in a general way about field shunting, but do not have a full understanding of the subject.

To appreciate the need of field shunting one must understand why we have transition (which includes field shunting) and that must include a knowledge of counter-electro motive force (counter emf) or counter voltage generated in a motor.

For traction motors to make most effective use of the power furnished by the generator, it is necessary to distribute the power according to the duty requirements of the locomotive. The constantly changing requirements, call for a re-distribution of volts and amperes from time to time, and this redistribution is what we know as transition. It involves changes of electrical connection or hook up arrangements of traction motors, including traction motor

(*Continued on page 49*)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

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Proven with Nationwide Service

the most practical tested lubricator

In general interchange service on roads in all parts of the country, in all temperatures. This on-the-line testing, combined with 39 years of journal box lubrication experience brings you this more efficient lubricator.

The only reversible journal lubricator that fits contour of standard journal box without distortion of lubricator structure.

two-way flexibility means security with the Journapak

Journapak is a three-section, reversible, reclaimable lubricator of heavy tufted non-glazing cotton chenille, wrapped completely around three separate resilient blocks of synthetic rubber foam, which absorbs 300% of its own weight of warm oil.

Journapak — designed to eliminate glazing, waste grab and unnecessary yard labor. Journapak combines all efficient advantages found in all other modern lubricators with no sacrificing of lubricating coverage.

"39 years of railroading experience have built SECURITY for you!"

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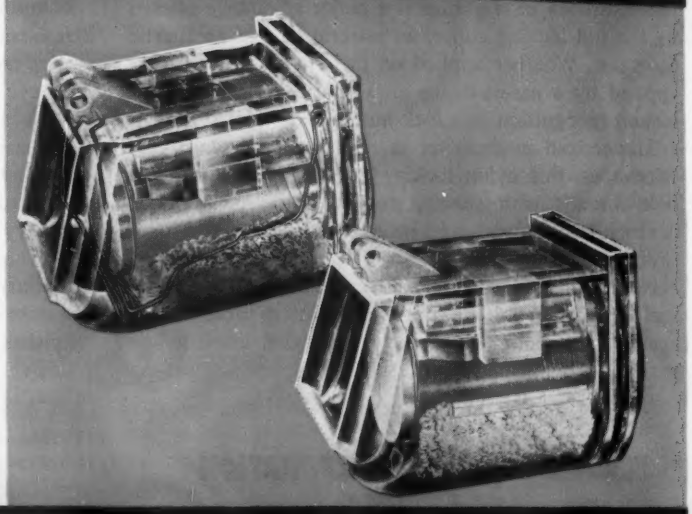

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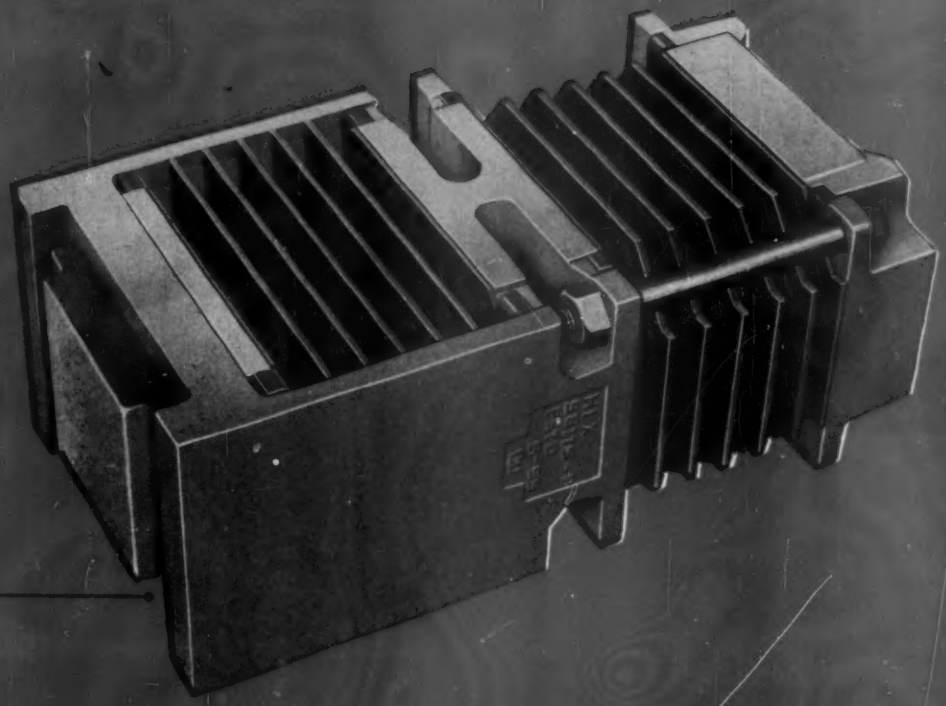

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Rubber, when properly applied, is the finest cushioning medium known. In National MF-400 gears, correct gear design and proper application of the rubber cushioning compound reach their highest point.

In addition to a *rated* capacity of 42,500 foot pounds, National MF-400 Rubber Draft Gears have a *reserve capacity of 54%*—or a total of 65,500 foot pounds.

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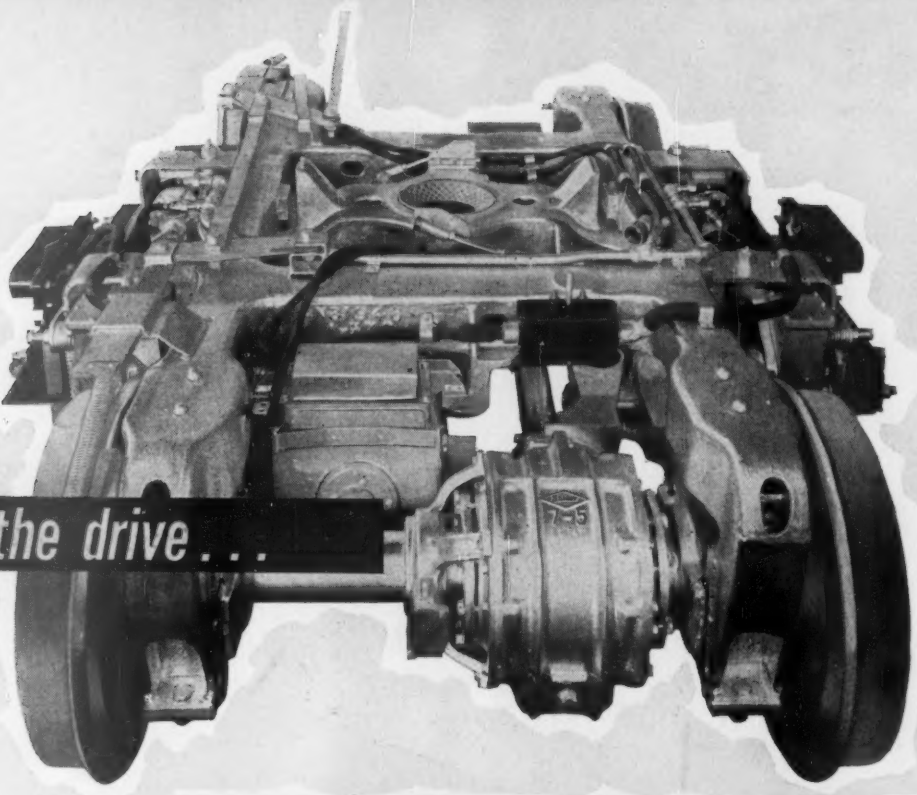
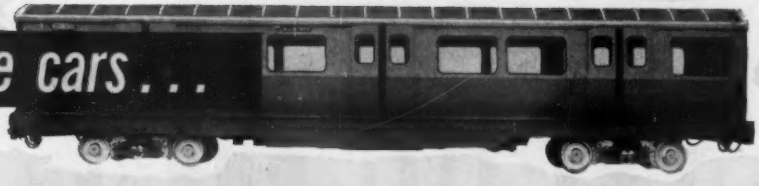
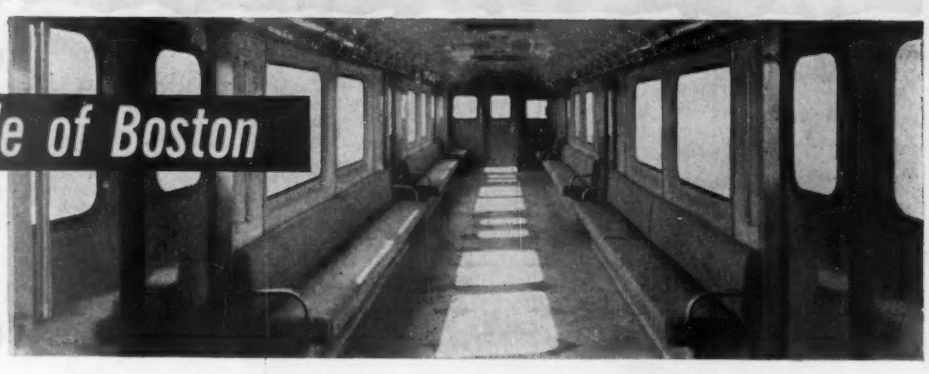


This is the drive...



that speeds the cars...



that serve the people of Boston

The Spicer Model 7-5 Traction Motor Drive now is in use in 50 new Pullman-Standard traction cars serving the Metropolitan Transit Authority of Boston, Mass.

This is a new Spicer Drive, developed to take advantage of the weight savings that are being incorporated into Rapid Transit car design through the use of lighter weight, higher speed electric motors.

The drive can accommodate hypoid gearing in ratios from 5.67 to 1 up to 9 to 1. The unit is furnished completely assembled, requiring no field adjustment, bearing alignment, or gear setting when installed.

More than 13,000 Spicer Drives of several types are now in use throughout the world. Write for technical bulletins, stating your requirements.

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Many of these products manufactured in Canada by Hayes Steel Products Limited, Merrilton, Ontario

DANA Spicer

HOW MUCH DO YOU KNOW ABOUT BRUSHES?

What Are Some of the Operating Difficulties That Can Appear to Be Brush Trouble?

THE MAJOR SOURCES of operating difficulties that can appear to be brush trouble are itemized below. The sequence of the entries has no relationship to the order of magnitude of any given failure cause, or frequency with which any type of failure occurs.

Brush Breakage

When caused by: a. Improperly adjusted motor nose-piece suspension clearance or broken springs in this suspension.

b. Willful or careless disregard for wheel slip indication on the road, at starting, and over crossovers or oil-slick rails.

c. Faulty bearings.

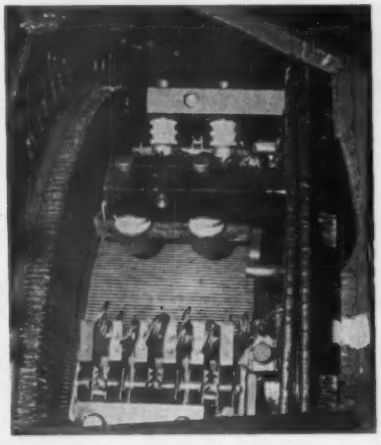
d. Overspeeding, sometimes with the tacit agreement of operating personnel who are forced to condone the practice to maintain schedules.

e. Allowing spring fingers to snap on brushes during installation or inspection.

f. Loose V-ings on the armatures.

g. A bad rail joint somewhere on the road.

This is the tenth of a series of questions and answers which are appearing each month.



Bar Burning

When caused by: a. Oil, grease, dust, or atmospheric contamination.

b. Overspeeding.

c. Loose V-rings or high resistance risers.

d. Maladjustment of brush holders.

e. Improperly spaced brush holders.

f. Incorrect electrical neutral setting of holders. (It can happen.)

g. Over-reduction of commutator bar face width due to careless slotting.

h. Failure to re-assemble machines with proper number of pole shims.

i. Out-of-round commutator over the maximum limit for eccentricity.

j. Dirty commutator slots.

Flashovers

When caused by: a. Disregard for wheelslip indication.

b. Failure to connect shunts of brushes to holder.

c. Shunts frayed off through failure to arrange them away from the spring finger.

d. Failure to arrange riser track brush shunts away from main generator risers.

e. Ring fire from worn out brushes.

f. Inadequate spring pressure.

g. Dirty or low meg-reading machines.

h. Faulty jumper cables between units.

i. Mistakes in electrical connections.

The above are only the more obvious causes for troubles which, at first glance may be thought to be due to brush failure. There can be many other causes more obscure and difficult for the maintenance man to find.

BY K. R. MATZ
National Carbon Company

When Amps Go Up . . .

field shunting at certain special times.

In a motor we have all the elements for generating an electric current, since we have rotating wire coils passing through magnetic fields. Although the motor is designed to deliver mechanical power when energized by current from an outside source, it cannot avoid generating a voltage within itself.

This is known as counter electro motive force since its voltage of pressure always opposes the applied voltage. The effect of the counter voltage is to limit or restrict the current that is forced into the motor by the applied voltage from the generator.

When the traction motor is starting the train, it draws a heavy ampere load from the generator, for the reason that at low speed, the counter voltage is low and this permits the motor to accept a heavy flow of amperes. As the train speeds up, the counter voltage increases, and the amperes received from the generator decrease.

In actual practice, the principal part of the terminal voltage in a traction motor at high speed is the counter voltage. The generator voltage is a comparatively few volts higher than the counter voltage from the motor. The production of coun-

(*Continued on page 62*)

Although still under construction large concrete work platforms, new buildings and lighting catenaries were installed when this photo was taken. Potomac built over 12,000 feet of new track.

Plenty of light and materials handling equipment are important. Some of Potomac's equipment: a 5-ton fork lift, two 6-ton crane trucks, three 1-ton flatbeds, and two 25-ton locomotive cranes.

(*Continued from page 32*)

plan involved the new car repair installation. There had previously been separate repair facilities for the two yards. Elimination of these provided space for additional southward classification tracks and for the proposed construction of a new hump for the northward yard. The new consolidated repair installation not only gave the space for yard expansion, but also made it possible to bring together the two separate work forces and put into operation new practices which speeded up car repairs.

The new installation consists of four repair tracks spaced on 26-ft centers. Two of these are used exclusively for repair of northbound cars and the other two are used only for southbound cars. Reinforced 8-in. concrete slabs form work areas for over 800-ft along both sides of all the tracks. Reinforced concrete jacking pads 24 x 24-in. run continuously along the edges of these platforms. The RF&P has found that the top of such a paved work area should be at the same level as the base of the rail rather than flush with its top.

Three new Armco metal buildings contain the individual shops and storage areas for the entire installation. The largest is 230 x 28-ft and contains the stores facilities, blacksmith shop, planing mill, air room, tool room, and paint shop. Two journal lathes and a wheel press are located in a separate 80 x 28-ft building. This shop does only journal work; all wheel work is done at the RF&P's main shop at Richmond, Va. The third building is an oil house for preparing and storing packing and lubricators. The locker rooms and offices are located in a two-story brick structure built at this site in 1942 and completely rebuilt in conjunction with this new shop.

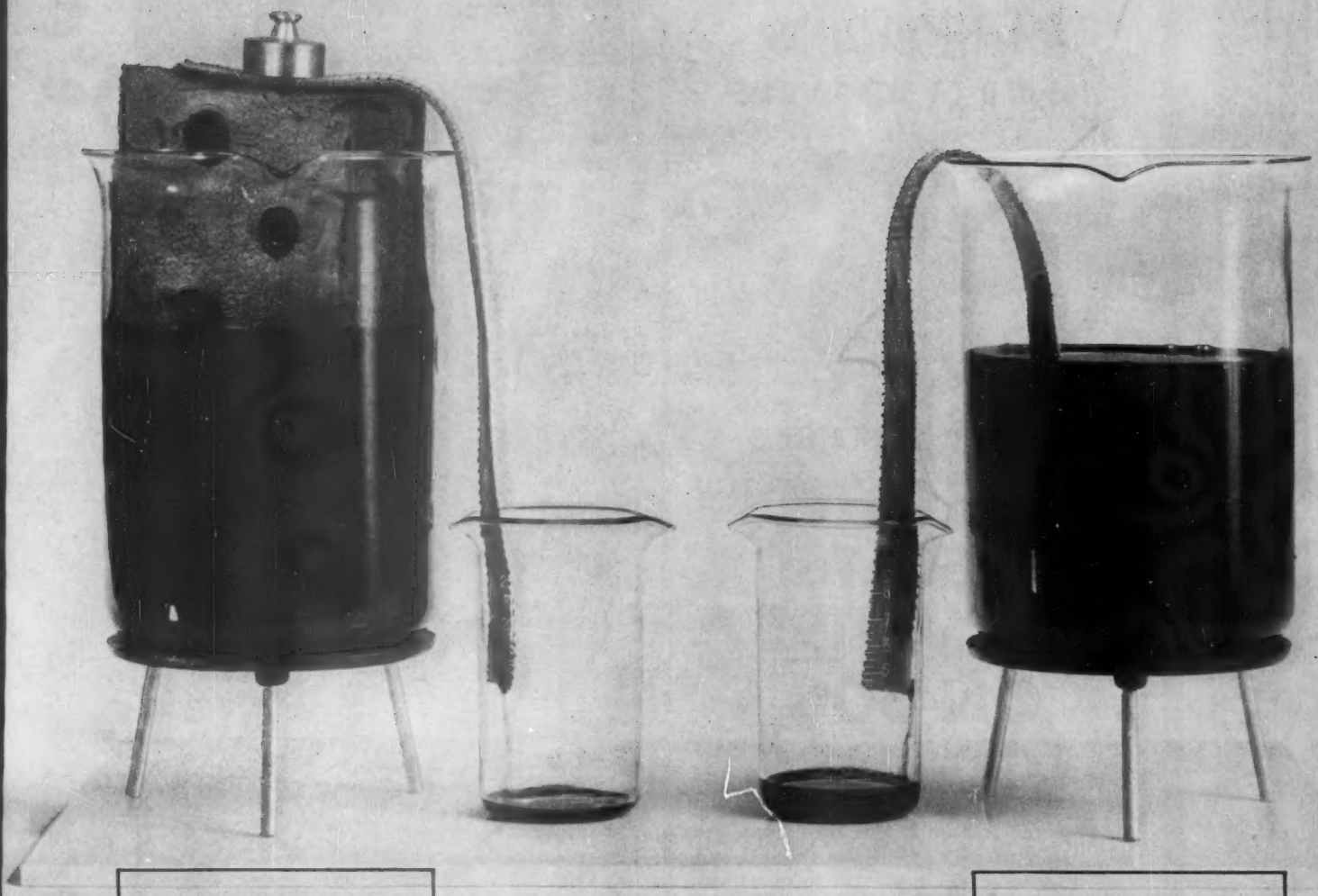
All of these have produced a repair yard with a capacity of 55 cars. Studies were made of the possibilities of using the "spot" repair system, but it was found that similar results could be achieved by making it possible to do night work in the facility which has been built.

The essential factor in the night operation is the lighting. This consists of 48 Westinghouse 400-w mercury-vapor Luminaires hung from transverse catenaries over the repair tracks. The catenaries are located approximately 100 ft apart. The resulting illumination varies from approximately 8 ft candles under the fixtures to approximately 2 ft candles midway on each platform between the fixtures. This has proved to be a satisfactory lighting level for car repair operations.

Light car repairs have not been placed on an around-the-clock schedule. Instead, there is a day shift from 8 am to 4 pm, and a night shift from 8 pm to 4 am. This gives two intervals of four hours each when the tracks can be switched. With this, cars are always forwarded at least twelve hours sooner, and many proceed 24 to 36 hours faster than they could under the old system.

This has produced a more efficient and economical repair system. Its price has been a small increase in the total force. However, overtime has been virtually eliminated, and there is the more intangible asset of less delay to loads found with defects.

Cars handled through this yard average between 4,000 and 6,000 daily. On a typical day recently, the first shift repair forces turned out 60 cars and the second shift 37. Total car department employees at Potomac Yard including inspectors on three shifts and car repair forces on two shifts number nearly 350. Less than 60 of these, however, are involved in the actual car repair operation.

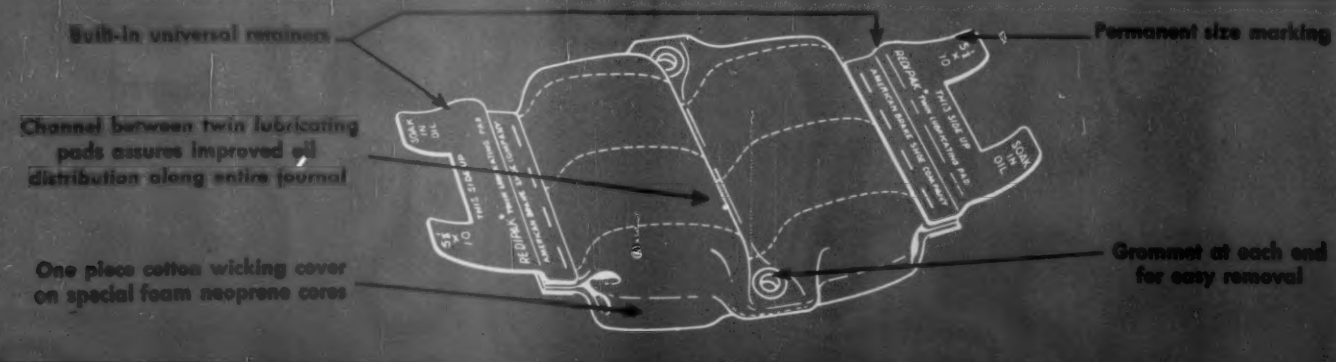


foamex core

woven cotton cover

Both core and cover wick oil!

Both the cotton cover and the Foamex core in Redipak Twin lubricating pads move a steady flow of oil to the journal. The woven cotton cover, unmatched in wicking ability, is lint-free. The foamex core not only provides the proper resilience, but it, too, wicks oil when saturated . . . all adding up to doubly effective lubrication!



Why Redipak® Twin Pads with Firestone* FOAMEX® provide superior lubrication

Superior lubrication that will effectively control hot boxes is assured with Redipak Twin lubricating pads, because of their unique design and the excellent lubricating properties of their woven cotton covers and Firestone Foamex cores.

Take the Foamex core . . . more than just a mechanical filler, this material, which is produced by Firestone to our physical specifications, actually wicks oil when saturated, holds over five times its own weight in oil, and keeps its shape and resiliency under extremes of temperature.

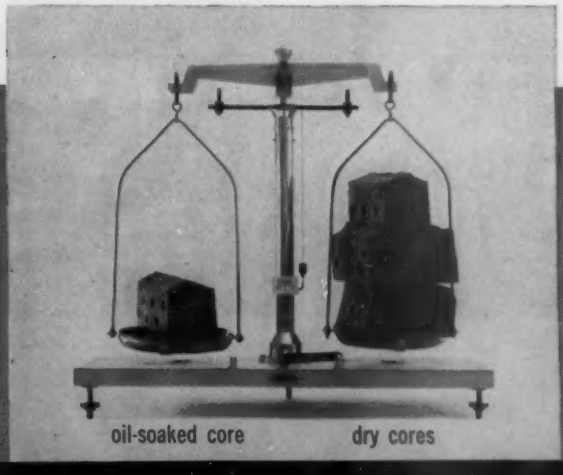
The wicking ability of cotton hardly needs explaining. When woven into a seamless cover for Redipak Twin pads, the result is a highly efficient wicking material that will not lint or glaze. Add to these properties, a unique design that provides superior oil distribution and positive shift prevention and you have Redipak Twin lubricating pads.

*A special formulation of Foamex is used for Redipak Twin pads.

AMERICAN Brake Shoe COMPANY

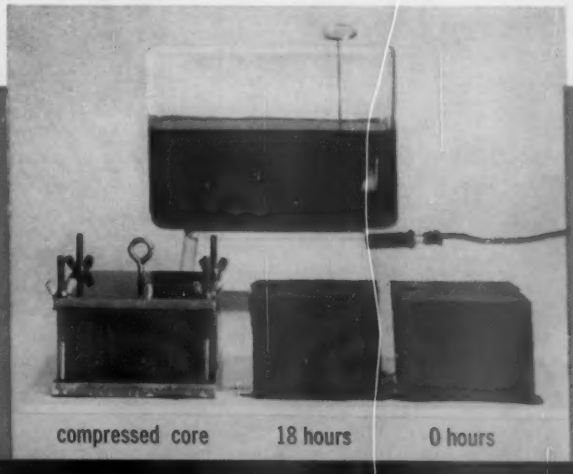
RAILROAD PRODUCTS DIVISION
530 Fifth Avenue • New York 36, N. Y.

Redipak's Foamex core holds over 5 times its weight in oil! Redipak Twin lubricating pads hold an amazing amount of oil. Why? Mainly because of the Foamex core with its millions of interconnected cells. One sample of oil-soaked Foamex weighs as much as five and one-half dry samples of the same size . . . in other words five times its own weight in oil. Thus, the Redipak Twin core provides a generous oil reservoir—even when there is accidental loss of free oil.



oil-soaked core dry cores

Redipak Twins keep their shape: The Foamex cores in Redipak Twin lubricating pads are produced to our physical specifications to resist taking a set under extremes of temperature. In this demonstration, adapted from actual production tests, one of two identically-sized samples has been compressed to 80% of its original height and immersed in oil at 250° F for 18 hours. At the end of that time, there was no difference in height between the tested sample on the left and the untested sample on the right. Despite compression under heat, the Foamex core held its shape.



compressed core 18 hours 0 hours

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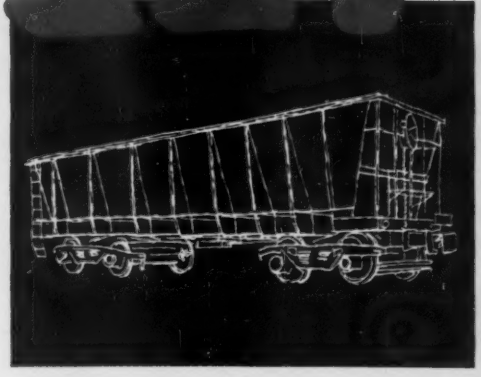

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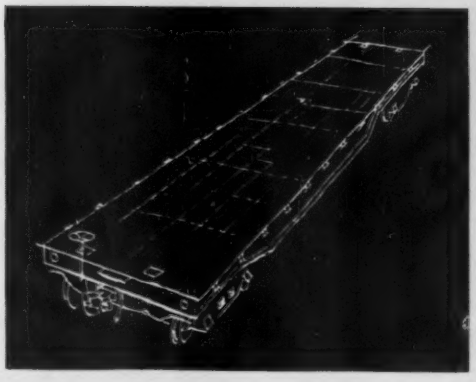
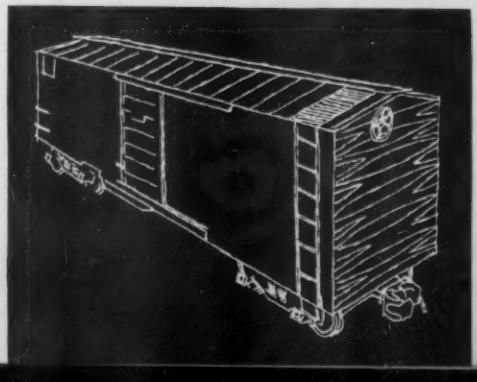
The Griffin EQS wheel comes in fewer tape sizes... accurate in all other dimensions to .020" tolerance ...almost perfectly balanced...and with strong, uniform flanges and rims.





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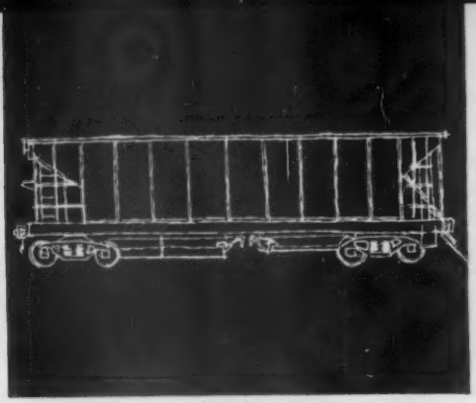

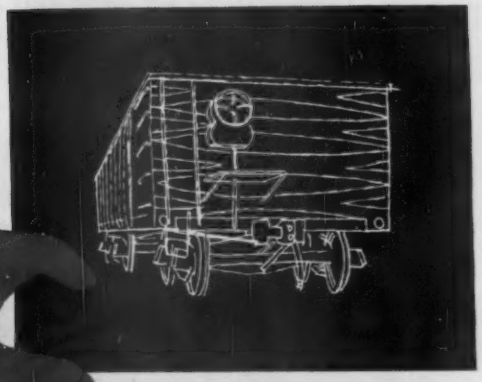

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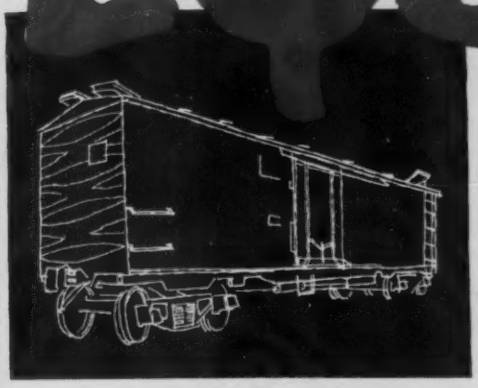

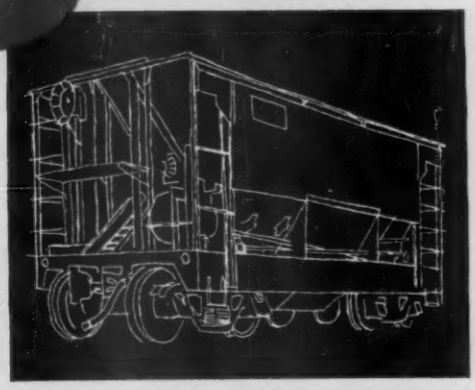

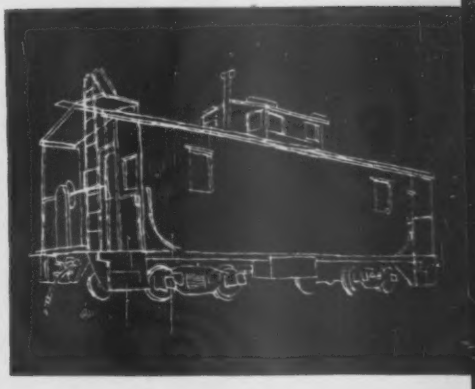

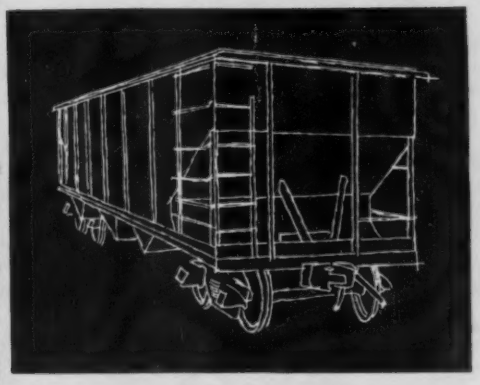

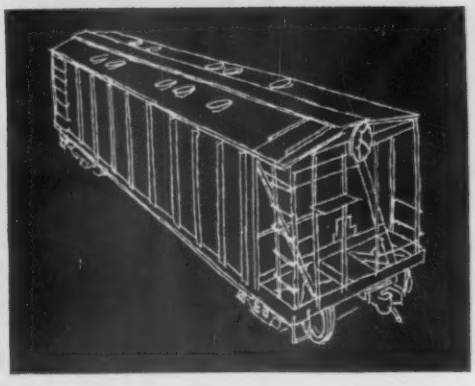

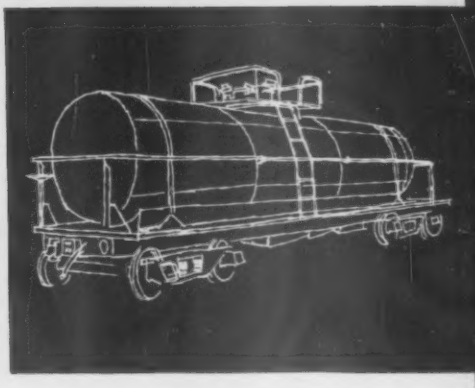

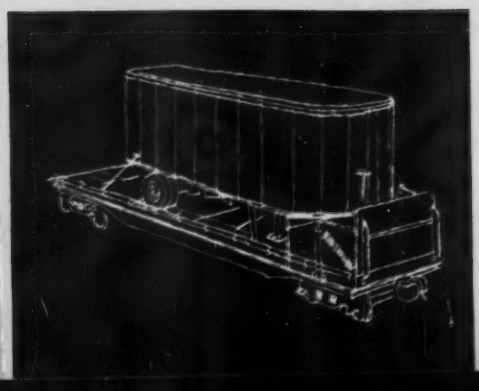

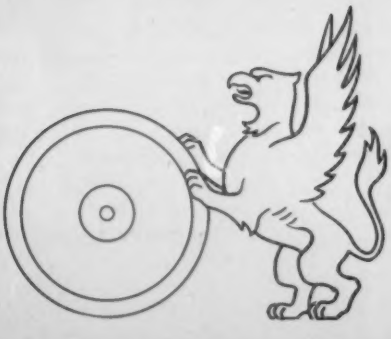

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PROBLEM PAGE

Riding Comfort of Passenger Cars

When a passenger car is reported as a "hard rider," what is checked and in what order is this work done? What is the most frequent cause of poor riding?

Many factors affect the riding comfort of railroad passenger cars, including truck design and maintenance, track repair and alignment, and carbody construction. The author* has found little difference in riding comfort between the four- and six-wheel trucks. Features of the modern truck are:

1. A one-piece frame with lined, integral pedestals to insure wheel alignment, and ruggedness to minimize maintenance.
2. Roller-bearing boxes, a "must" for smooth high-speed operation, without hot boxes.
3. High-speed brakes with wheel-slip control to insure a smooth, minimum-stopping distance.
4. Rubber-cushioned draft anchors for easy transmission of longitudinal forces from the wheels to the car body.
5. Equalizer coil springs to cushion rail impacts. Equalizers keep weight on both boxes in case of spring breakage, preventing derailments from this source.
6. Shock absorbers across the bolster springs preventing resonant build-up.
7. Fabric damping pads at springs, equalizer feet, and swing hangers to reduce transmission of noise and high-frequency vibrations.
8. Bolster suspension outside the truck frame for ready inspection and fast renewal of defective parts.
9. Swing hangers in combination with the shear deflection of bolster springs to produce soft lateral action.
10. The central bearing to prevent shimmy.
11. Resilient coil springs supporting the bolster on a wide spring base, providing roll stability for the carbody.

A poorly maintained truck will soon drive away traffic. The modern truck is designed for easy maintenance, but no piece of machinery can run indefinitely without attention. The one-piece cast-steel truck frame maintains its alignment indefinitely, except for wreck or abuse, and it is only necessary for the maintainer to renew worn parts to restore it to its original true condition.

Weight Distribution

To insure that the four corners of a car have equal spring deflections, it is necessary to know the actual weight carried by each spring. The weight of each end of the car may be obtained with a conventional track scale. The weight of each side of the car may be obtained by means of three-point support weighing where one end of the car is supported on a ball and socket with the weight distribution of the opposite end determined by electronic load cells. Both ends are similarly weighed and, by rolling the car through known angles, the location of the center of gravity longitudinally, transversely, and vertically may be readily determined. The overturning speed on curves can be determined when the vertical location of the center of gravity is known.

Proper brake application and slack control, negotiating curves with regard to speed restrictions, starting and stopping, and control of trains through changes in profile can contribute substantially to the riding quality.

Cylindrical-tread wheels have less tendency to hunt, and thus impart less lateral motion to the truck than do tapered wheels. The only difficulty is that they do not stay cylindrical long; after a few thousand miles they become worn so that the beneficial contour is lost.

Riding conditions affected by wheel unbalance and eccentricity were investigated by the AAR which found that "the detrimental effect of wheel unbalance on the riding of the test car was inconsequential when the total unbalance per wheel was below 2 lb at rim radius. The investigation of the effect of wheel machining shows that the limiting condition of wheel unbalance can be met by the semi-finish machining of wheels. Wheel-tread eccentricity (up to 0.035 in.) had no important effect on the riding of the test car."

The quality of track affects the ride. Correlation between track conditions and riding qualities has been established by a number of railroads by operating a ride recorder over their lines, and pinpointing rough spots for attention of the track department.

Spring Nose

The coil springs, themselves, may set up annoying vibrations, such as hum and rattle. Hum is of the order of 50 cycles per second and, when excessive, causes a rumbling sound within the car. Investigations show that this hum is caused by surge of the spring, which is a relative vibration of the middle coils with respect to the end coils. Insulation against transmission of this vibration to the car body has been partially successful. Rattle of springs

(*Continued on page 58*)

A paper presented by W. E. Burdick, engineer of tests, General Steel Castings Corporation, before meeting of Railroad Division, ASME, at New York, December 5, 1957. The topic was previously discussed in RAILWAY LOCOMOTIVES AND CARS in the following issues: March 1956, p 91; April 1956, p 70; and July 1956, p 70.

INSIDE STORY

of the economical answer to the HOT BOX PROBLEM

The Big Question: Could a permanent journal bearing conversion package be created that would require little modification and maintenance, cost less to buy and install . . . and end hot boxes?

Railroaders discussed an idea. It interested a prominent railroad which promptly put its top designers to work on it.

Bearing maker was called in to apply its experience and engineering resources to further development of the idea.

AAR APPROVED
for limited application
in interchange service

RESULT! the CLEVITE Sealed Sleeve Bearing Cartridge

. . . a new, permanent journal bearing conversion for freight cars

Less Modification . . . Lower installing costs!

Modification is simple. Remove waste retainer ribs and dust guard pocket. Machine journals and collars to AAR dimensions with a practical tolerance (.002–.006 in.).

Installation requires little time and only a few standard tools. Low cost renewal of all working parts.

Successfully tested, duplicating extremes of service to the equivalent of 12 years hard operation. In 2 years of road service, Clevite Cartridges are performing perfectly—and tests are continuing.

Get complete data now on features and performance of the Clevite Cartridge . . . the permanent, soundly engineered answer to your "hot box" problem.

Test it on your road!

CLEVITE MAKES IT!

Using the precision methods of Cleveland Graphite Bronze Company Division of Clevite Corporation, Cleveland 10, Ohio.

STANDARD CAR TRUCK COMPANY

DISTRIBUTES IT!
Ask for a representative to call and discuss your requirements.

STANDARD CAR TRUCK COMPANY
332 So. Michigan Ave., Chicago 4, Illinois

IN CANADA: CONSOLIDATED EQUIPMENT COMPANY, LTD., MONTREAL 2, QUEBEC

(*Continued from page 56*)

can become very disturbing. This appears to be caused by nested coils impinging on each other. The solution for this problem is to increase the diametral clearance between coils and to center them with each other.

Noise is often mistaken for rough riding, and proper noise insulation throughout the truck and car structure can do much to increase passenger comfort, particularly on sleeping cars. Noise and vibration annoying to passengers can originate in the end draft connections and diaphragms and are often mistaken for truck noises. Maintenance here is required, and much progress has been made in insulating these points with fabric damping pads. Rubber draft gears and tightlock couplers have helped to keep down the slack.

Test Equipment

The Three-Way Ride Recorder was developed by engineers associated with the University of Illinois and, since the war, has come into general use. The instrument records vertical, longitudinal, and lateral car body accelerations and, within its frequency response, reproduces the impressed accelerations with fair accuracy. Mileposts or other information may be coded on a chart by means of a marker. The chart is clock driven at 6 in. per min so that the distance between milepost marks, in seconds, may be used to establish operating speeds.

When more detail is desired, electric accelerometers are used. Motion indicators can be readily constructed from spring-steel strips with a strain gage. These strips are clamped to one truck member and driven by an adjacent member. Relative motions between the two produce signals which are calibrated and recorded on an oscillograph.

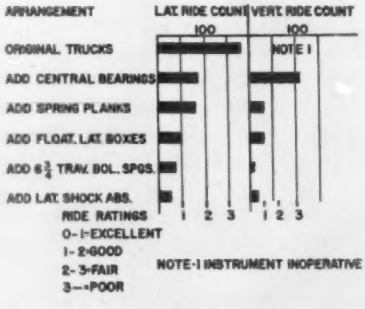
There are a number of accelerometers of the "impact-counting" type in use. These instruments totalize the disturbances reaching certain preset intensities and are useful in an overall evaluation of the riding qualities of a car. They do not locate points of disturbance.

A test program carried out on a problem car will illustrate the testing technique. This car, a bedroom-lounge, was reported for rough riding. It was equipped with inside-hanger trucks with the following characteristics: (a) conventional center plates; (b) roll stabilizers; (c) restricted lateral journal roller bearings; (d) bolster coil springs with 3¾ in. static travel.

Changes were made to this truck, one at a time, as follows: (a) central bearings replaced center plates; (b) spring planks replaced roll stabilizers; (c) free lateral boxes applied on new wheel-axle assemblies; (d) static travel of bolster springs was increased from 3¾ in. to 6¾ in.; (e) lateral shock absorbers were added.

The ride recorder was used to check the riding quality of the car and to provide statistical data or grading the ride. Runs were taken over about 12 miles of main-line track at practically the same speed and the car was in the same consist position. Since the test extended over a two-year period, wheel changeouts were inevitable, but most of the data was based on low wheel mileage with 1:20 treads. No check was made of wheel unbalance. Duplicate runs, when made, showed consistent results. The quality of the ride is numerically established by summating the excursions of the recording styli by lines crossed and obtaining the average per mile. Based on our riding experiences, we have established a grading of riding comfort. The bar diagram shows ride values obtained by each change made to this car, from which it is noted that the riding qualities improved from poor to excellent.

A serious ride complaint is shimmy, which is a lateral vibration



Bedroom-lounge car riding qualities were improved in six steps.

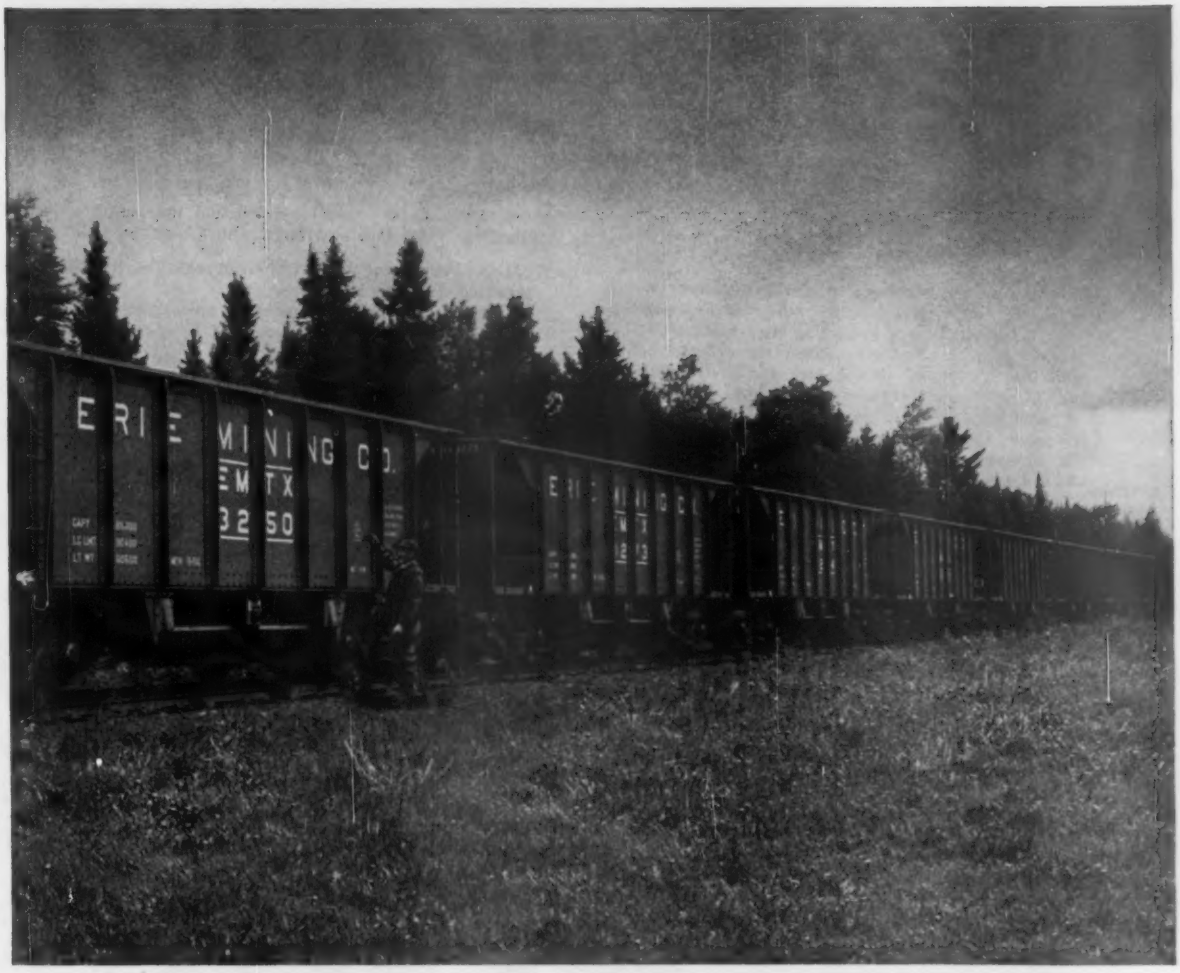
in the range of 3 to 4 cps. It usually develops at speeds above 60 to 65 mph and is ordinarily associated with a slight tread wear. When double flanging is observed, it is often caused by shimmy. By retarding truck swiveling on tangent track, this mode of vibration can be checked. The central bearing rotates against a friction pad and thus suppresses shimmy. With swivel-control, shimmy has disappeared.

Oscillographic equipment is satisfactory for measurement of events in the riding range of frequencies. For higher frequencies in the sonic range—in fact, from 20 cps upward—vibration measurements can be made on equipment that will measure vibration amplitude and analyze the resultant waves. A tape recorder can be used to preserve these vibration patterns for later playback. With these instruments, annoying vibrations can be traced to their source and corrective measures taken. The eccentric oscillator can be used to trace the source of vibrations of 6 cps and upward.

Yaw Problem

With the exception of shimmy, the most annoying lateral vibration in a car is due to yaw; that is, when the front of the car travels to the left, the rear travels to the right. This is a natural mode of vibration and can be easily excited with the car at rest by a man using a crowbar. As the car travels along the track, the natural hunting of the wheels will seek out this mode, and can cause an almost continuous vibration to be sustained. The vibration will tend to be restrained by adjacent cars, so it is usually the most severe at the rear of the train. This motion is not particularly a function of truck design, since modification of swing-hanger length or angularity, spring stiffness or location, and other similar modifications will merely shift the natural frequency a slight amount.

Any means by which the hunting of the wheels can be checked, or kept from disturbing the truck, will improve this yawing motion. If it were possible to place the trucks on the percussion centers of the car, the coupling of the truck actions by the mass of the car would cease to exist, and each truck would respond only to its own track irregularities.



Main Line on the Taconite Run

This stretch of lonely, uninhabited country lies between Hoyt Lakes and Taconite Harbor, Minnesota. The railroad, operated by Erie Mining Co., is used to haul taconite from the great processing plant at Hoyt Lakes to the harbor on Lake Superior, 73 miles away.

The 389 hopper cars required for the system were built by Bethlehem at its Johnstown, Pa., shops. Each of the cars has a capacity of 95 tons, and when level-full holds 1433 cu ft of load. The four-hopper bodies are of riveted-and-welded construction, and the cars are equipped with Type F couplers, 36-in. multiple-wear heat-treated wrought-steel wheels, forged-steel heat-treated axles, empty and load and clasp brakes. Items such as these are an aid to safe, dependable service, and they help reduce maintenance and repair expense.

The cars are excellent examples of what Bethlehem can build in open-top designs. When your own requirements call for something of this nature, by all means check with our engineering division. We can design the type of car you have in mind, or work from plans that you yourself supply.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

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QUESTIONS and ANSWERS

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W263-Q—What additional air flow takes place?
A—At the same time, main reservoir air flows through a choked warning port to the exhaust opening to sound a warning as long as the handle is in sanding position.

W264-Q—How is sanding in the forward operation provided?
A—By moving the sander valve handle to the extreme right position.

W265-Q—Describe the air flow in the right hand position.
A—Main reservoir air is connected through a port in the rotary valve to port *13* and the forward sanding pipe, also through a choked warning port to the exhaust.

W266-Q—What is the position midway between Forward and Reverse?
A—**Neutral** position.

W267-Q—Is there any air flow when the sander valve is in Neutral position?
A—No. Main reservoir air is cut off from both sanding pipes in *Neutral* position.

Bell Ringer Valve Operation

Instruction Pamphlet 5046-15, Page 45 (Plate 1)

W268-Q—How is the bell ringer valve operated?
A—To operate the bell ringer valve, lower valve handle *187a* is moved to the left, out of *Neutral.*

W269-Q—What is the air connection in this position?
A—Main reservoir from chamber *C* is connected through the port in rotary valve *179a* to port *10* and the bell ringer pipe.

W270-Q—What takes place when the handle is moved to Neutral?
A—Port *10* from the bell ringer pipe is disconnected through the rotary valve and connected to the exhaust port, thus stopping the ringing of the bell.

Equipment Arranged for Multiple Unit Operation

W271-Q—What does standard equipment for multiple unit operation consist of?
A—The basic 6-SL equipment, with a three position brake pipe cut out cock instead of a two position type. An H-6-B Relayair valve unit, a check valve and a 5/16 in. choke for the main reservoir pipe.

W272-Q—What operation is available with this equipment?
A—By operating the independent and automatic brake valves on the lead or controlling unit, the brakes on this unit and a trailing unit can be controlled as on a single locomotive.

W273-Q—What components make up the H-6-B Relayair valve unit?
A—The H-6-B Relayair valve unit (Fig. 35), consists of a pipe bracket which mounts two Relayair valve portions designated as the transfer valve and the cut-off valve. A third mounting face is covered with a blanking pad.

W274-Q—With what operating pressure is the transfer valve provided, and how is it furnished?
A—The transfer valve provides an operating pressure of 25 psi above the diaphragm, furnished by means of a spring arrangement.

Instruction Pamphlet 5046-15 (Page 46)

W275-Q—With what operating pressure is the cut-off valve provided?
A—The cut-off valve's spring arrangement provides 50 psi operating pressure.

W276-Q—How does the transfer valve function?
A—It performs the transfer functions between lead and trailer unit operation, previously found in the transfer valve portion of the 6-DKR distributing valve.

W277-Q—How does the cut-off valve function?
A—It functions to close the connection to the equalizing pipe in case of a break-in-two between units.

W278-Q—How does the break pipe cut-out cock on the brake valve function on this equipment?
A—It controls the usual brake pipe connection to the brake valve and also controls the main reservoir connection to the transfer valve diaphragm chamber.

Operation (Plate 11)

W279-Q—What additional pipes are required on equipment arranged for multiple unit operation?
A—1-Main Reservoir Pipe. 2-Equalizing Pipe. 3-Transfer Valve Operating Pipe.

W280-Q—How does the additional main reservoir pipe function?
A—This pipe couples the air supp.ly from the trailing unit main reservoir and compressor system to that of the lead unit, augmenting supply of air for train braking.

W281-Q—What is the purpose of the equalizing pipe?
A—The equalizing pipe conveys air at brake cylinder pressure from the distributing valve of the lead unit to the distributing valve of the trailing unit.

W282-Q—How does this air pressure control the brake cylinder pressure on the trailing unit?
A—Through the application portion of the distributing valve.

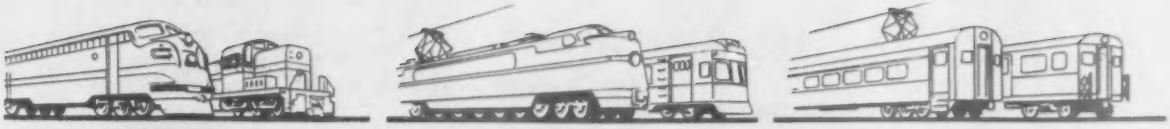
W283-Q—How does the transfer valve operating pipe function?
A—The transfer valve operating pipe connects passage *9* of the brake valve with chamber *D* of the transfer valve portion of the H-6-B Relayair valve unit.

W284-Q—How is remote control of the transfer valve obtained through this pipe?
A—By means of the brake pipe cut-out cock.

W285-Q—What are the air connections with the brake valve cut-out cock on the first locomotive in lea dposition?
A—Chamber *D* above the diaphragm of the transfer portion of the H-6-B Relayair valve unit and the transfer valve operating pipe are vented to the atmosphere.

W286-Q—How does this connection affect the transfer valve portion ?
A—With no air pressure on diaphragm *10* of the transfer valve portion, valve *17* is held off its seat by spring *19.*

W287-Q—What action now takes place in the cut-off valve portion?
A—The main reservoir air on diaphragm *10* of the cut-off valve portion forces it downward, unseating valve *15.*



DIESELS ELECTRICS MU CARS

ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 4, Ill.

FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

MAGNUS High Mileage

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES

Wheel Flange Lubricators

Safety Valves

Fuel Tank Sight Gages

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

When Amps Go Up . . .

ter voltage by the traction motor is the principal reason for having transition of power controls.

For example on an E.M.D. freight unit there is a heavy ampere demand to get the train started. At 19 miles per hour the generator voltage has risen to about 930 volts, and the amperes will have dropped to about 600 or lower. At that moment more torque output is required of the motors to accelerate train speed. Increased torque demands more amperes.

To provide more amperes we might call on the generator to increase the voltage to pressure more amperes through the motor. But that is not too good as any material voltage increase might spark a flashover through a leakage path.

Field shunting is accomplished by contactors which provide a shunt to by-pass a portion of the applied current around the field coils through a shunting resistor. The resulting weakened field strength reduces the counter voltage, which permits the motor to accept more amperes to increase its torque to accelerate train speed.

When it later becomes necessary for further transition to a parallel motor hook up, the field shunting circuit is cut out and does not again come into use until the No. 4 transition.

Field shunting is normally used for the purpose of increasing traction motor speed.

Transition is desirable on increasing speeds for best train acceleration. On decreasing speeds, such as on a heavy grade, transition is imperative to prevent overloading the main generator.

When the engine on a diesel locomotive is putting out constant horsepower, the generator is putting out constant watts or kilowatts. "Volts times amps is watts" and the power from the generator is passed on to the motors with lots of volts and few amps at high locomotive speeds and relatively few volts and high current values at low speeds. It is necessary to put a limit on both voltge and current, but between these limits, it is always possible to exchange volts for amperes and keep the same power. Transition and field shunting are simply means of keeping current and voltage values within reasonable limits.

Personal Mention

(*Continued from page 18*)

motive inspector, enginehouse foreman, shop foreman and general foreman at various points. Appointed master mechanic, Waterloo, Iowa, in 1951, general superintendent motive power, C&NW, in April 1956.

Clinchfield.—*Erwin, Tenn.:* Title of P. O. LIKENS changed from superintendent of machinery to chief mechanical officer.

Erie.—*Cleveland:* HEINZ P. ZYDOR appointed assistant mechanical engineer. Position of supervisor tools and machinery abolished. PAUL L. GREEN appointed assistant to superintendent of motive power. Position of supervisor of materials and records abolished. *Meadville, Pa.:* MATHEW L. LARKIN appointed engineer of tests and chief chemist. *Jersey City, N. J.:* JACK L. CRAFT appointed road foreman of engines, New York division. *Marion, Ohio:* ROBERT R. MITCHELL appointed road foreman of engines, Kent division. *Salamanca, N. Y.:* ARTHUR G. CLEMENCE appointed road foreman of engines, Allegany-Bradford divisions.

Great Northern.—*St. Paul, Minn.:* JOHN L. ROBSON appointed to newly created position of assistant vice-president, operations. JAMES H. HERON, superintendent of motive power, succeeds Mr. Robson as chief mechanical officer.

Hannibal Connecting.—*Hannibal, Mo.:* E. G. EPPERSON appointed supervisor, motive power and equipment, succeeding to duties of CHARLES HORSTMEYER, retired superintendent equipment.

Louisville & Nashville:—As a result of their recent merger, former employees mechanical of the Nashville, Chattanooga & St. Louis have become associated with the L&N as follows: *Louisville, Ky.:* D. A. REAVIS, assistant superintendent of equipment; W. A. GAINES, assistant electrical supervisor; WINDSOR STONE, assistant engineer of tests, and E. J. MOSER, JR., analyst.

New York Central.—*Buffalo:* RICHARD F. BORSOS, diesel locomotive inspector, appointed division supervisor air brakes and steam heat, motive power. *West Springfield, Mass.:* JOHN F. MIZZI appointed general foreman, car department. Formerly special engineer at New York. *Stanley, Ohio:* WENDELL B. FISCUS, special inspector. appointed division supervisor air brakes and steam heat, diesel shop.

Norfolk & Western.—*Bluefield, W. Va.:* W. F. OLIVER appointed assistant car car foreman. *Lamberts Point, Va.:* W. I. STULTZ appointed assistant car foreman, succeeding Mr. Oliver. *Williamson, W. Va.:* R. L. LENOIR appointed assistant car foreman, succeeding Mr. Stultz. *Shaffers Crossing, Va.:* J. W. BECKNER, gang leader, appointed gang foreman, succeeding Mr. LeNoir.

L. E. Gingerich

E. C. Hanly

Pennsylvania.—*Philadelphia:* L. E. GINGERICH appointed chief mechanical officer, succeeding HOWELL T. COVER, assistant vice-president-chief mechanical officer, who is on leave of absence. HANS H. HAUPT appointed assistant to the chief mechanical officer. HARRY M. WOOD appointed superintendent, equipment, Philadelphia Region, succeeding Mr. Haupt. EDWIN C. HANLY, superintendent, equipment, Northern Region. Buffalo, succeeds Mr. Wood as assistant chief mechanical officer-car.

Richmond, Fredericksburg & Potomac.—*Acca Terminal, Richmond, Va.:* J. A. W. SMITH, assistant master mechanic, Potomac Yard, appointed general foreman locomotive department. R. G. SELFE, diesel supervisor, appointed assistant general foreman locomotive department.

Southern.—*Sheffield, Ala.:* PRINCE B. ELEAZER, JR., appointed general foreman. Formerly general foreman at Atlanta, Ga. *Memphis, Tenn.:* HUGH L. SELLERS appointed enginehouse foreman.

Southern Pacific.—CHARLES O. KRAMER appointed assistant electrical engineer.

Obituary

Easley B. Bailey, assistant car foreman, Norfolk & Western at Bluefield, W. Va., died October 9.

Supply Trade Notes

NATIONAL ALUMINATE CORPORATION.—National Aluminate has recently completed a five-story addition which more than doubles its administrative and laboratory facilities at Chicago.

■

WAUKESHA MOTOR COMPANY.—Waukesha has purchased the complete plant and assets of the *Climax Engine Manufacturing Company* of Clinton, Iowa, manufacturers of internal combustion engines.

(*Continued on page 66*)

HAULING A LOAD...REPAIRING THE ROAD

ESSO DIOL RD 77—Specifically developed for the heavy-duty engines of modern locomotives, Esso Diol RD 77 assures peak efficiency and long, trouble-free engine performance—high standards that mean extra lubrication economy.

ESSOLUBE HD—For smaller, high-speed diesel engines in maintenance-of-way equipment, Essolube HD detergent-type motor oil provides dependable engine protection . . . cuts oil consumption with long-lasting lubrication.

Skilled Esso technicians are ready to analyze your petroleum needs and recommend the best fuel or lubricant for your diesel equipment. For information or technical assistance, call your local Esso office, or write: Esso Standard Oil Company, Railroad Division, 15 W. 51st Street, New York 19, N. Y.

ESSO RAILROAD PRODUCTS

Supply Trade Notes

(*Continued from page 64*)

K. G. Douglas

V. J. Boudreau

J. J. Sieber

C. T. Janik

ELDORADO MANUFACTURING CORPORATION.—*Kenneth G. Douglas* has been named president, and *Vernon J. Boudreau,* vice-president-sales, of the newly formed Eldorado Manufacturing Corporation at Eldorado, Ill., which is doing a variety of reclamation work, including power assembly units, for railroads. Mr. Douglas was formerly sales manager for the Parts Processing Corporation, Battle Creek, Mich., and superintendent of the Eaton Manufacturing Company. Mr. Boudreau was manufacturers representative for the Parts Processing Corporation.

■

BRODERICK & BASCOM ROPE CO.—*J. J. Sieber* has been elected vice-president in charge of sales. *K. B. Britt* succeeds Mr. Sieber as sales manager.

■

KYSOR HEATER COMPANY.—CLARENCE T. JANIK, sales manager, has been named vice-president.

■

MET-L-WOOD CORPORATION.—*D. O. Williamson* has been appointed sales manager at Chicago.

■

WESTINGHOUSE AIR BRAKE COMPANY, AIR BRAKE DIVISION.—*S. L. Poorman,* vice-president, sales, has retired.

■

LEWIS BOLT & NUT CO.—*E. T. Brown* has been appointed vice-president.

■

DUFF-NORTON COMPANY.—*Robert J. Beck* has been appointed assistant chief engineer, Jack division. Mr. Beck was formerly with the Atomic Power Division of the Westinghouse Electric Corporation.

E. W. Ahlstrom

W. W. Gould

W. J. McGraw

THOMAS A. EDISON INDUSTRIES, EDISON STORAGE BATTERY DIVISION.—*Robert H. Weeks, Jr.*, has been appointed assistant division manager at West Orange, N. J.; *James A. Mustard, Jr.*, general sales manager at West Orange; *William W. Gould*, Chicago district manager, and *Elmer W. Ahlstrom*, Cleveland district manager. Mr. Weeks was previously general sales manager; Mr. Mustard, regional sales manager, Chicago and St. Louis districts; Mr. Gould, Cleveland district manager, and Mr. Ahlstrom, field engineer at Cleveland.

■

THOR POWER TOOL COMPANY.—*William J. McGraw* has been appointed general sales manager, and *Clarence B. Bergren*, manager of Thor electric and SpeedTool sales, both with headquarters at Aurora, Ill. Mr. McGraw was previously electric tool sales manager, and Mr. Bergren, Milwaukee branch manager.

■

GOULD-NATIONAL BATTERIES, INC.—*C. W. Hanna* has been appointed Chicago regional manager of the Industrial Division.

■

DEVILBISS COMPANY.—*D. L. Bohon* has been transferred from Los Angeles to the home office sales department in Toledo, Ohio. *George W. Fulton* succeeds Mr. Bohon as West Coast regional sales manager.

■

K. W. BATTERY COMPANY.—*Ward Dickover* has been appointed vice-president in charge of operations. He was formerly chief engineer, Industrial Division of Gould National Batteries, Inc., and more recently consultant and director of the battery laboratory at the National Bureau of Standards, Washington, D. C. *Edward J. Campbell* has been appointed sales engineer in the Minnesota-Iowa area. He was previously

sales representative for the Clark Equipment Company.

Obituary

CHARLES R. ELLICOTT, retired vice-president of the Westinghouse Air Brake Company, died on November 24 in Glen Ridge, N. J.

What's New

(*Continued from page 10*)

top capacity is 300 cfm. No special tools are needed for assembly or disassembly. *Sales Promotion Department, Le Roi Division, Westinghouse Air Brake Co., Dept. RLC, Milwaukee 1.*

Electric Lantern

The steel and aluminum lantern illustrated, designed for railroad service, has a heat-treated aluminum bail with heavy Neoprene coating. This provides a firm grip, and resistance to oil. The bail stays in position, yet may be moved readily on a permanently fixed rivet attachment tested for 15,000 operations without losing original tension.

For permanent brightness, the reflector is of stainless steel. At the flip of a switch, it throws a broad, strong signal, or a spot for reading car numbers. A clip in the cap holds two spare bulbs. *Adams & Westlake Co., Dept RLC, Elkhart, Ind.*

Plastic Cable Wrapping

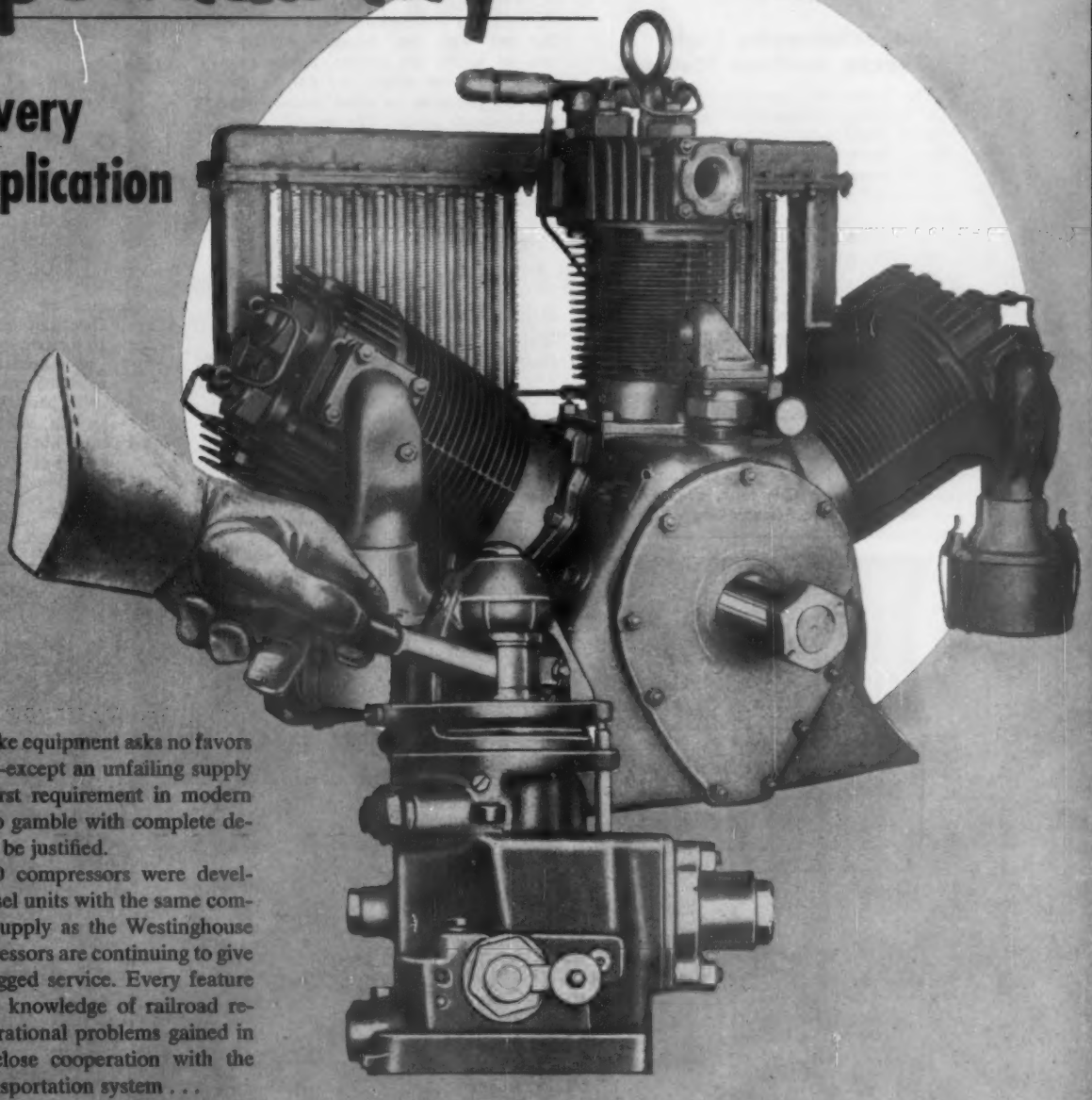
Amp-Spirap is a spirally-cut plastic wrapping that eliminates tedious cable lacing, insulation damage, and pulling of wires through spaghetti tubing. It is quickly applied to wire bundles of any

(*Continued on page 70*)

WESTINGHOUSE CD COMPRESSORS

put dependability

behind every brake application



Westinghouse Brake equipment asks no favors on any assignment—except an unfailing supply of air. That's the first requirement in modern train control, and no gamble with complete dependability can ever be justified.

Westinghouse CD compressors were developed to provide Diesel units with the same completely reliable air supply as the Westinghouse Steam Driven compressors are continuing to give through years of rugged service. Every feature reflects the intimate knowledge of railroad requirements and operational problems gained in over 80 years of close cooperation with the nation's leading transportation system . . .

Radiator-type intercooler between high pressure and low pressure cylinders reduces temperature of discharge air and increases efficiency.

Full-pressure type lubrication system maintains even, constant flow of filtered oil to connecting rod crankshaft bearings and wrist-pin bearings.

Throw-off of oil from connecting rod bearings lubricates cylinder wall and also main crankshaft ball bearings.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PA.

size up to 3½ in. diameter and permits individual wires to be entered or led out at any point. It may be unwound to allow wires to be added, removed, or relocated, eliminating the need to cut into the cable bundle after assembly. It holds wires together tightly, but permits flexibility for forming cable and provides mechanical protection over the entire length of cable. *Amp Incorporated, Dept. RLC, Harrisburg 19, Pa.*

Monochromatic Light Checks Surface Flatness

The Lapmaster monochromatic light is a compact self-contained unit of heavy gage sheet steel with a baked metallic gray finish. The unit is (4) times larger than previous models. The light is 11 in. by 14-in. with a work stage size of 10 in. sq.

A heavy duty 9,000-volt transformer provides an average of 40 foot candle power at the diffusing glass. Its light head may be tilted back and adjusted for height to permit maximum light on the check area. On pieces too large for the work stage to hold, the light head may be swung completely around to permit checking of work on a bench. Using Lapmaster Optical Flats, the unit is said to offer the most accurate method of checking and inspecting surface flatness on lapped parts of any size. *Crane Packing Company, Dept. RLC, 6400 Oakton st., Morton Grove, Ill.*

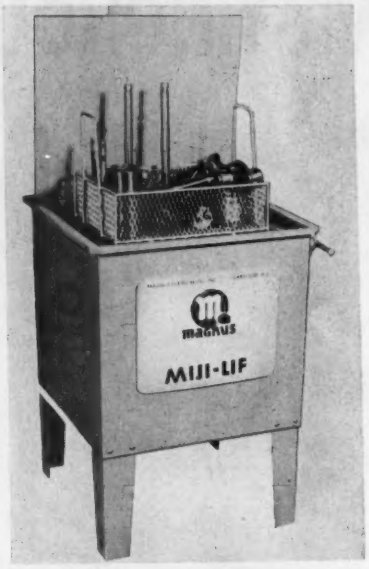
Angle Attachments

These angle attachments were developed for use with the recently developed line of Keller air drivers, angle screw drivers and nut setters. To simplfy production fastening in close quarters and hard-to-reach places. The manufacturer's No 2 air motors power both the 12G-2 series screw drivers and the 16G-2 series nut setters and are said to provide more speed, increased power, low noise level and low maintenance. *Gardner-Denver Company, Dept RLC, Quincy, Ill.*

Agitator Cleaner

The Miji Lif has been designed for the cleaning of small parts such as maintenance right-of-way equipment, signals, air brakes, injectors, and governors, etc. Batches of parts up to 75 lb can be cleaned in the unit.

Operation of the cleaner is by compressed air. A flick of the unit's operating lever brings the platform to the top of the tank, out of the liquid for inspection, loading and unloading the work. A second flick of the lever lowers the platform to the bottom of the tank where the work is automatically agitated up and down in the solution, shearing the dirt from the parts.



The cleaning units are available in heated and unheated models. The 30 gallon size has a working platform of 21 x 18 in. *Equipment Div., Magnus Chemical Co., Dept. RLC, Garwood, N. J.*

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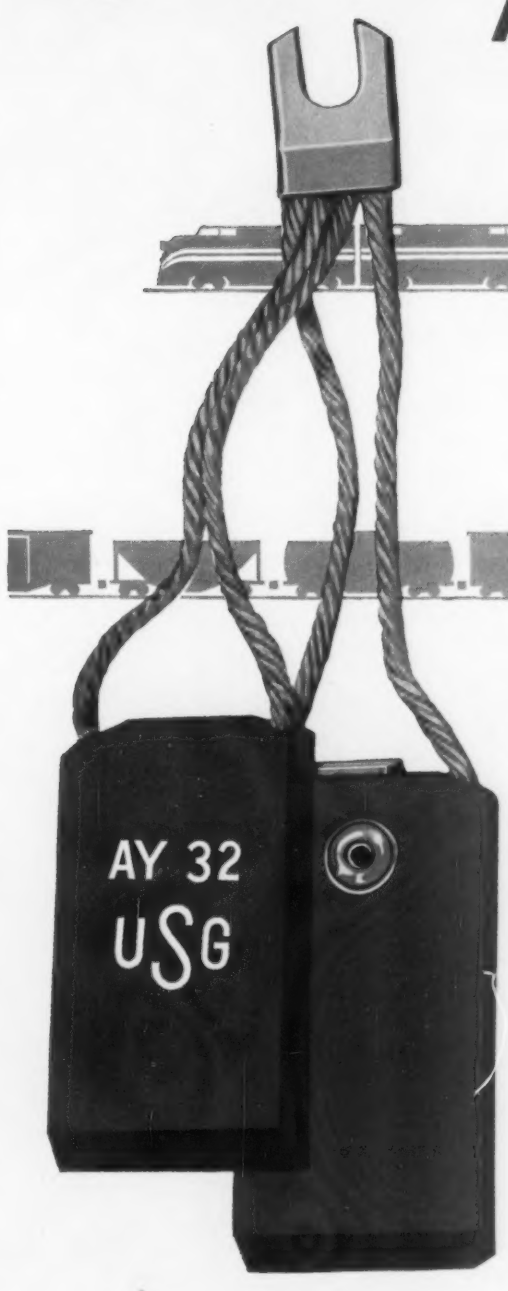

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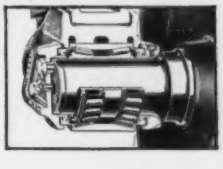

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